COMPUTERWORLD
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NEWSPAPER

CW Photo by A. Dooley

## Trash or Treasure?

**Shoppers rummage through bargains at the recent opening of Boston's Computer Warehouse Store. Outfits like this – "a cross between a scrap pile and world of dreams" – are spreading throughout the country to accommodate the growing number of computer hobbyists. See story on Page 2.**

# DEC Expands Its High End With Decsystem Offerings

By Esther Surden
Of the CW Staff

MARLBORO, Mass. – Digital Equipment Corp. has expanded its large-systems offerings upward with the introduction of a top-of-the-line Decsystem-20 and dual- and single-processor versions of a high-end Decsystem-10.

The medium-scale Decsystem-2050 is said to have double the performance of the Decsystem-2040 with a 25% increase in cost. It is in the performance range of the IBM 370/138 and 148, according to a spokesman.

The Decsystem-1090, which costs 10% to 20% less than its 1080 predecessor, is DEC's most powerful offering to date and can be compared to the IBM 370/148 and 158, according to DEC. The 1099 is the dual processor version of the 1090.

Designed for scientific, educational and engineering users, the 2050 features a cache memory not available on the 2040, DEC noted.

The 160-nsec cache gives the CPU an effective average access time of 244 nsec. Typically, data being written into or read from memory can be found in cache between 90% and 95% of the time, DEC claimed.

### Available to 128 Users

The 2050 can accommodate up to 128 simultaneous time-sharing users while processing multistream batch requests, the firm said. Memory is expandable from 1.25M- to 2.5M bytes.

The system can accommodate up to 3.2G bytes of on-line disk storage using DEC's RP06 disk units, it added.

The Tops-20 operating system, developed for the 2040, has been enhanced for the 2050 to allow an increased number of jobs to be processed simultaneously, according to the spokesman.

As with the 2040, the 2050 features Computer Controller Operation using a PDP-11/40 minicomputer for system start-up and as a driver for card readers, line printers and interactive terminals, the spokesman stated.

Present 2040 users can upgrade to the 2050 in the field for $100,000 to $200,000, depending on the amount of main memory needed and the work necessary to install the cache and other enhancements, he said.

With the 2050, DEC announced Basic Plus-2, a Basic compiler which is said to be compatible with DEC's PDP-11

*(Continued on Page 4)*

## *Management Called Poor*

# Medicaid Systems Hit for Deficiencies

By Edith Holmes
Of the CW Staff

WASHINGTON, D.C. – Deficiencies plague the automated federal and state Medicaid programs, investigators for the Senate Subcommittee on Investigations charged here recently.

These programs, which cost the Federal government nearly $1.5 billion annually, could well form the foundation on which the nation builds the claims-processing system for the proposed national health insurance program, according to staff investigators.

The Medicaid Management Information System (MMIS), developed and funded by the Department of Health, Education and Welfare (HEW) Office of Information Systems (OIS), suffers from management problems, according to a report prepared by investigators David Vienna and Walter S. Fialkewicz.

OIS is responsible for approving and funding state proposals for the design, development, installation and operations of MMIS implementations.

The Federal government provides 90% of the funds needed for system design, development and installation. Once a system is certified by HEW, a state can recoup 75% of the cost of operating that system.

### Problems With Program

But there are problems with the program. The Senate investigators fear contracts for MMIS systems haven't been competitive enough, testimony indicated.

They view certification of a "fragmented" or multiple computer system used for the MMIS program in Texas, for example, as a dangerous precedent.

OIS itself is in need of a management system, the investigators said. The agency does not have the necessary financial data to manage the program properly, nor does it follow through to determine if states are using the data generated by the systems financed with "higher level" federal funds.

Noting the OIS filing system may indicate the broader management problems in the agency, the report said it "is so sloppy key documents are missing."

Furthermore, the agency does not keep track of overruns and system add-ons, which also receive 90% federal funding.

And, "though certification of developed systems carries with it 75% federal funding for the operation of such systems, OIS doesn't know exactly how much money this involves."

In addition, OIS "never verifies whether the sophisticated management information developed by the new systems is actually used by the states to spot fraud and abuse, identify problem areas of utilization and other key data elements required of such systems," Vienna and Fialkewicz reported.

California Health Department employees, for example, told the subcommittee staff the data produced by their certified MMIS is stacked on a table and not read, according to the report.

Competition in state contract awards for MMIS must be fair if federal funding is to be granted, but that is not always the case, the investigators pointed out.

Serious questions can be raised over a

*(Continued on Page 6)*

# User Hands Over Tapes to IRS After Losing Appeals Court Fight

By John P. Hebert
Of the CW Staff

NEW YORK – In what appears to be the first case of its kind, a billion-dollar insurance holding concern headquartered here fought an Internal Revenue Service (IRS) demand for original computer tapes – and lost.

Continental Corp. handed over the 37 tapes to the IRS last week under orders from the Second Circuit Court of Appeals here, which reversed the 1975 opinion of a district court.

The tapes contained records of expenses and losses incurred from 1971 to 1972. If the company chose to retain copies of the tapes, it had to duplicate them "at its own risk and expense," the appeals court ruled.

Continental officials thought they had a case in 1973 when the IRS first requested the original tapes for audit purposes, according to Bill Gleason, tax counsel for the insurance company.

At that time, Continental turned over computer printouts made from the original tapes, explaining the hard copy it supplied the IRS was sufficient. Dissatisfied with the submission, the IRS sent a written request for the tapes in 1975, but the firm refused to comply.

Continental resisted the IRS summons for the tapes, Gleason said, on grounds that they are not "books and records," as specified by the government agency.

Computer tapes are just processing tools and nothing more, the corporation told the IRS at the time, Gleason recalled.

### IRS Goes to Court

The IRS had different ideas. It brought the case to court in September 1975 and, in December, Judge Henry F. Werker of

*(Continued on Page 6)*

# *Packet Net Seen Best Option*

By Stuart L. Mathison
Special to Computerworld

Faced with providing remote access to an interactive computer system, the data communications planner typically takes a look at the amount of usage expected from various remote locations and then compares the economics of building a leased private-line network vs. using conventional public circuit-switching facilities (i.e., the long distance telephone network).

Today the public packet network presents another alternative – one that not only compares favorably in cost, even for the largest users, but is technologically superior in many respects to a private-line network.

Compared with even the most sophisticated private line configuration, the public packet network comes out ahead in four major areas:

1. Its ability to adapt to changing and often unpredictable terminal communication requirements – new locations, increased traffic loads, new types of terminal equipment and new applications.

2. Higher quality service than is possible in the typical private-line network.

3. Reduced direct costs for communications as well as better utilization of the company's computer, terminal and staff

*(Continued on Page 8)*

**CW Special Report on Data Communications Networks follows Page 34.**

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### Outfits Now Number About 78

# Boston Store for Hobbyists Opens Doors

By Ann Dooley
Of the CW Staff

BOSTON – "A cross between a scrap-pile and a world of dreams." That's how one computer hobbyist described the Computer Warehouse Store that opened here this month.

Owned by American Used Computer Corp., the Computer Warehouse Store claims to be the largest in the country in size and amount of merchandise. Its stock includes a range of microcomputer kits built around Intel 8080, Motorola 6800 and Fairchild F-8 microchips.

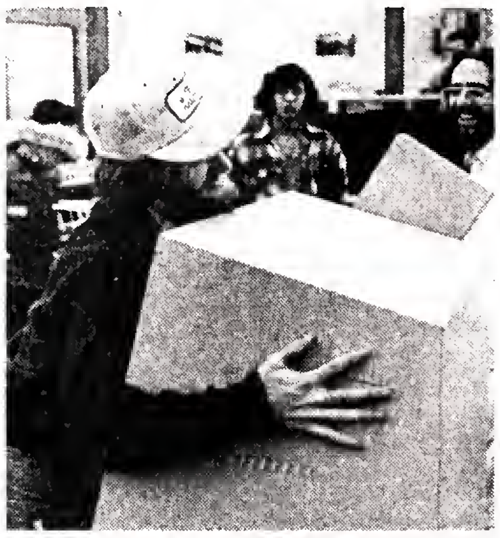
The Computer Warehouse Store is only one of an estimated 78 such stores that have opened throughout the U.S. in the past year or so. The hobbyists they serve spent an estimated $15 million on equipment this year, according to Pertec Computer Corp.

Bill Grinker, one of American Used Computer Corp.'s owners, believes about 12,000 hobby computers are in use today.

The Byte Shop of Pasadena, Calif., opened on Sept. 9. It is one in a chain of approximately 30 such stores across the country.

"It took about $40,000 to $50,000 to get us started, but it can be done for less," according to Guruprem Sing Khalsa, the Pasadena store's general manager.

The most popular item sold is IMS Associates' Imsai 8080, Khalsa said. "We sell to a whole spectrum of people: professionals, hobbyists, novices and business people who are just realizing they can afford them now," he added.



CW Photo by A. Dooley

**Dave Irvine lovingly clasps Recordak 1824 reader he won at the Computer Warehouse Store's hourly giveaway. He later admitted, "I can't think of anything to do with it."**

The Computer Store in Pensacola, Fla., which opened in May, offers calculators ranging in price from $9 to $1,700 in addition to minicomputers.

"We soon discovered our name was bringing microcomputer and kit people into our store, and we're at present just getting into this area," sales manager Richard Roth said.

"We feel we may be the only store-type operation where an individual can see a demonstration of a $9 calculator, a $400 microcomputer or a $20,000 minicomputer when he walks in off the street," he added.

The Computer Workshop opened its doors in September, selling out of Betsy and Lawrence Chinnery's home in Rockville, Md. The store has since moved to a new location and is open only at night and on weekends because Lawrence Chinnery continues his job with a systems engineering company during the day.

"We are doing nicely and have just opened another store in Kansas City," Betsy Chinnery said. "We saw this field coming and we got into it."

The store carries the Southwest Technical Products, IMS Associates and Polymorphic Corp. lines.

In Ann Arbor, Mich., Compumart, Inc. set up shop last April to serve industrial, college and hobbyist needs, according to Jor Chin Ho, store manager, and David Rosche, president. An international mail order department is also operating successfully, Ho said.

"The most popular computer we have is [MOS Technology, Inc.'s] KIM-1, followed by the Imsai 8080," she said.

Ron Guberman's Media Reactions opened in March in Reston, Va., in the "shadow of the CIA."

The store is the tenth largest seller of computer hobby supplies in the country, Guberman claimed.

IMS Associates is the most popular vendor and Multiplex Communication, Inc.'s products also move very quickly, he said.

"We run the gamut of servicing DP professionals to those interested mainly in playing Star Trek," he said.

### Clubs Spawned

The overwhelming interest in "computer hobbying" has also spawned a variety of computer hobby clubs. In McLean, Va., about 40 people – only one of whom has any strong connection with the DP industry – are members of the Chesapeake Computer Club.

Near Palo Alto, Calif., another group goes by the unlikely name of "The Homebrew Club."

And not far from Washington, D.C., an "in-house" club flourishes at Ft. George Meade in Maryland, the site of the National Security Agency, the U.S. Army Intelligence Agency and the First Army.

Most clubs have their own newsletters, but hobbyists interested in new products and feedback from others nationwide subscribe to a monthly newspaper devoted to their interest.

The newspaper is called *People's Computer Company* and is published in Menlo Park, Calif.

# Five Men Sentenced for Altering Clients' Records at TRW Credit

LOS ANGELES – Five men convicted of conspiring to alter hundreds of credit records at TRW Credit Data and making false statements were sentenced last week in federal court here.

The five men were charged with working with an employee of TRW to alter computerized credit records of poor-risk clients [CW, Sept. 13]. Some of the companies victimized by this plot included Diner's Club, American Express, Master Charge, the Bank of America, Sears Roebuck and several leasing firms, the *Los Angeles Times* reported.

Philip Kostoff, the ringleader, was sentenced to 60 days in jail to be served on consecutive weekends, placed on five years' probation and fined $3,000.

The other four defendants – Paul Kostoff, Ronald Rossi, John R. Dubos and Kenneth L. Stevenson – were each sentenced to 40 days in jail, placed on five years' probation and fined $1,000.

A sixth man initially indicted in September, Sean Shanahan, was found guilty by the jury of conspiracy but acquitted of a false statement charge. Judge Manuel Real then acquitted him of both charges.

## On the Inside This Week

NEWS

Antitrust Drama Unfolds With Atypical Cast . . . . . . . . . . . .4
DP Numbers 'Significant' in UK White-Collar Unions . . . .10
UK Unions Pursuing DPers . . . . . . . . . . . . . . . . . . . . . . .11
Mini Intervenes in 'Family Feud' by Scoring Points . . . . . .12
Societies/User Groups . . . . . . . . . . . . . . . . . . . . . . . . . . .14
Mainframes, Minis Seen DP's Endangered Species . . . . . . .16

THE HUMAN CONNECTION

Clear Writing Called Path to System Optimization . . . . . . .17

EDITORIAL

Editorial: Washington Simmering, Bell Cooking . . . . . . . . .18
The Human Connection: Stone Writes to Carter . . . . . . . .19
Taylor Report: Readers Get to Seat of Overbooking . . . . .19
Figures Show Users Spend Less With Intel Than IBM . . . .20

SOFTWARE & SERVICES

CPE Evolving Into Performance Management: Kiviat . . . . .23
Data General's AOS Controls Eclipses Heuristically . . . . . .24
'Kiviat Blob' Adds New Dimensions to System Tuning . . .26
DBMS Enhances Insurer's Ability to Aid Customers . . . . .27
On-Line DBMS Coordinates System Reliability Files . . . . .28

COMMUNICATIONS

Small Users Suffering From Big Network Access Costs . . .29
Burroughs RT 5000 Teller Handles EFT Transactions . . . .30
TRW Has Modular Units For Bank Transaction Systems . .31

TERMINAL TRANSACTIONS

Megatek 6014 Offers Upgrade for Tektronix Plot 10 . . . . .33
Informer R-301 CRT Designed for Factory Floor Use . . . .33

SYSTEMS & PERIPHERALS

Distributed Processing Net Keeping Mopac on Track . . . . .35
Authorized Service Helps Merchants Beat Bad Checks . . . .36
Mass. Hospital Saving $525/Mo With Microfiche . . . . . . . .37

MINIWORLD

Billboard Firm Switches From Batch . . . . . . . . . . . . . . . . .41
English Urged to Replace 'Claptrap' Documentation . . . . .44
Charles River Data Has Add-On Floppy for PDP-11 . . . . . .45

COMPUTER INDUSTRY

Value of Installed Systems Seen Double in Five Years . . . .47
Series/1 Marks 'Firsts' for IBM . . . . . . . . . . . . . . . . . . . . . .47
Memorex Almost Killed Itself by Diversifying: Guzy . . . . .50

# PEOPLE

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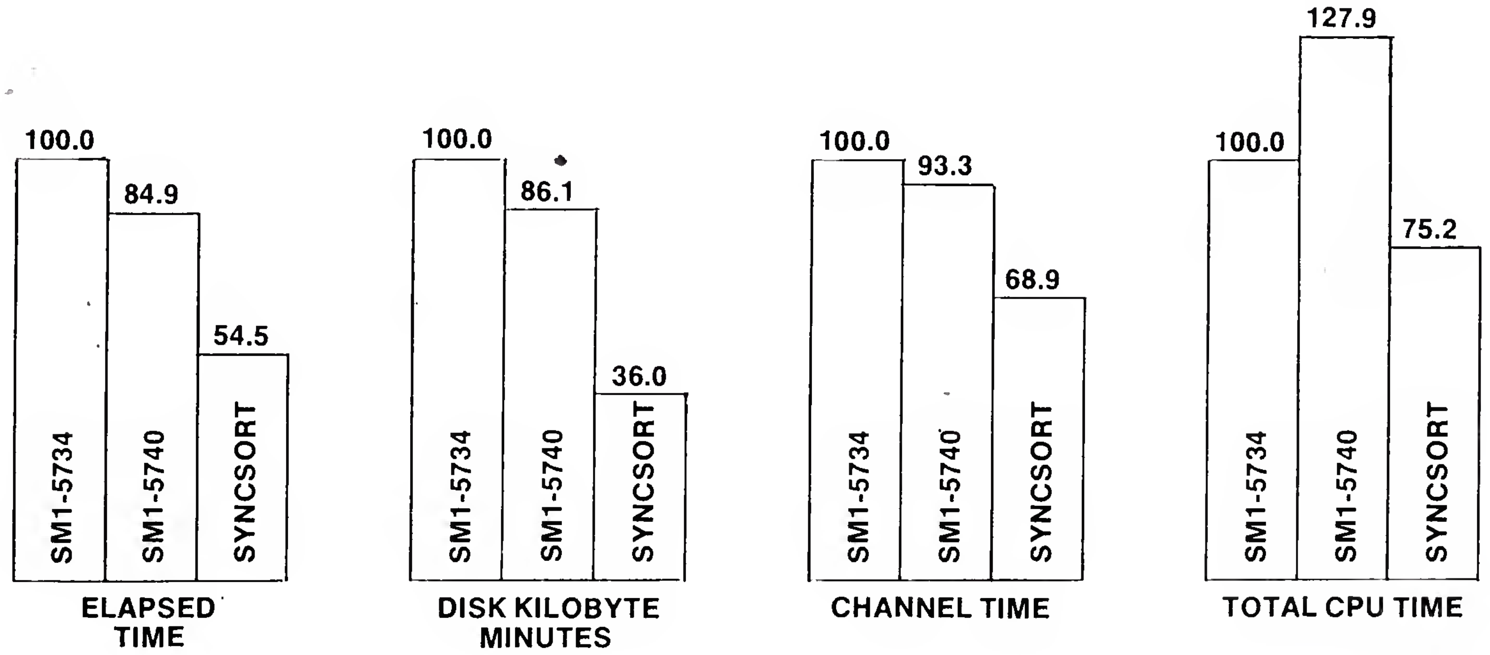
*Volume Ten, Number Three, 1971.

The last time this happened, we matched our SyncSort III-and-half against the Hardware Manufacturer's SM1-5734 and SM1-5740 (PEER/ICEMAN).

Frankly, the results weren't even close. IBM sent its own MF-1 monitor to evaluate the tests, and a human observer to make certain that everything was according to Hoyle. But all to naught.

SyncSort performed better than the other two sorts in every category, as illustrated below:



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# Antitrust Case Unfolds on Coast; Drama Features Atypical Cast

By Molly Upton
Of the CW Staff

LOS ANGELES The proceedings in Courtroom 8 here look like any ordinary trial, but the opening scenes in California Computer Products, Inc. (Calcomp) vs. IBM show it transcends the run-of-the-mill civil cases usually heard here.

For one thing, the antitrust case has a special judge, imported from Idaho for the proceedings. Some of the attorneys come from one of the most prestigious New York law firms; others come from a Los Angeles outfit that specializes in prosecuting antitrust suits against some of the largest corporations in the U.S.

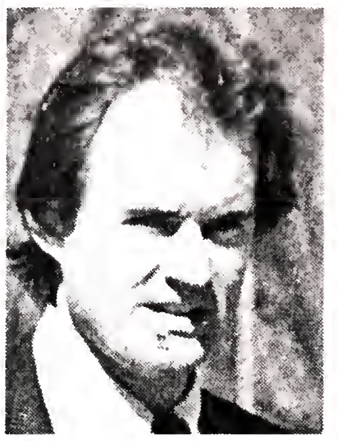
Even the court reporters – among the most important extras in a scenario like this – are special, coming not from the pool for this court but from an outside firm and chosen for their ability to speak and understand "computerese."

While Calcomp's lead attorney, Max Blecher, and David Boies, who heads the sizable IBM cast, appear eager to parry with each other when the curtain goes up on the main act in the trial, the opening scenes are adopted from the long-running, if boring, U.S. antitrust case against IBM.

The script to date has come from that off-off-off-Broadway production, with the parties and their associates entering testimony and depositions already heard in Courtroom 110 in New York.

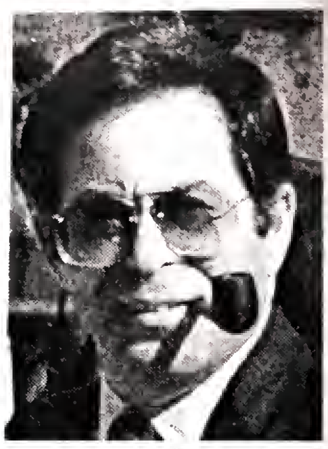
Under the present arrangement, Blecher or an associate reads selected portions of the questions asked by the Justice Department; Boies' team then reads the appropriate cross-examination.

In inserting selected portions of the New York transcript into the record – a procedure to which the two parties had previously agreed – a Calcomp employee takes the witness stand, assuming the role of the executive being questioned.



Boies

McNichols



CW Photos by M. Upton

Blecher

At one point, however, Blecher seemed to fear Boies was upstaging him.

When Blecher realized Boies intended.to insert as much material as possible from the New York case into Blecher's portion of the case, the Calcomp attorney objected. He accused Boies of trying to "obfuscate" his material with parts of the transcript that went beyond the bounds of his questioning.

On Blecher's second or third objection, Judge Ray McNichols told Boies to refrain and, if he wished, read the objectionable portions of the testimony during the IBM portion of the case.

Despite – or because of – an earth tremor measuring 3.8 on the Richter scale that was greeted with smiles and quizzical looks from several jury members, attorneys and spectators last Monday, Harold Collins, Blecher's partner, proceeded undisturbed in his questioning of the stand-in for Robert S. Oelman, former NCR chairman.

McNichols provides a great deal of what little diversion there is in the large, windowless air-conditioned courtroom – much to the relief of jury, spectators and attorneys.

# DEC Adds Decsystems To Expand High End

(Continued from Page 1)

RSTS/E Basic Plus-2 language.

The top-of-the-line Decsystem-1090 introduced last week was designed for educational institutions, commercial organizations and industrial users, DEC said. It features a different processor from its 1080 predecessor.

Users of the 1080 can upgrade in the field to the 1090 for about $40,000, the spokesman said. No reprogramming or recompiling is necessary, he noted.

The 1090 CPU, called the KL10B, includes internal channels which replace external units that interfaced to the system's memory, he explained. All I/O transfers now go through the CPU, he said, adding up to eight channels can be accommodated within the processor.

With the enhanced processor, DEC announced a variety of subsystems to increase performance.

A memory subsystem called the MH10 allows main memory to be expanded from a minimum of 256K 36-bit words to a maximum of 4M words through the use of double-density technology, DEC said.

Also announced for the 1090, the DN87S communications subsystem combines asynchronous and synchronous communications in one front-end unit.

Previously, two separate units were needed for these functions.

Disk drives with capacities of 100M- and 200M bytes, which can be equated to IBM's 3330- and 3330-11-type moving head disks, were also announced for the 1090.

A basic Decsystem-2050, which will be available in January, costs $550,000 with 256K words of memory, 16 lines, 400M characters of disk, one tape drive and a line printer.

An entry-level 1090, available in March, includes 256K words of memory, 32 communications lines, and 500M characters of on-line storage and costs about $700,000.

A 1099 with 1M words of memory, several billion characters of on-line storage and 128 user lines costs about $2 million.

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Conversion from CICS is a one-time batch process. Once a program is converted it runs as, and can be maintained as, a native TASK/MASTER program. New code to take advantage of the TASK/MASTER features not available with CICS can be added at any time.

### Programmerless Systems

Version II of TASK/MASTER starts a new trend toward "programmerless systems". One example is Message Management, a powerful application development feature that can cut your programming costs by over 50%. Message Management allows the actual "end user" to sit at a terminal and, with the help of the computer, design data formats and specify editing rules. Message Management then automatically builds the input and output portions of the application program.

Another example is TASK/MASTER's Data Entry Feature, a complete on-line data entry system that requires no application programming. Data Entry has facilities which are simply not available with stand-alone systems, including 100% data editing through on-line access to your database.

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# User Loses Appeals Battle, Turns Over Tapes to IRS

(Continued from Page 1)

the District Court for the Southern District of New York ruled the IRS could have copies of the tapes, according to Gleason.

The court also decided that all costs of handing over the originals would have to be borne by the IRS.

Both parties in the case – U.S. and Walter Ross [IRS revenue agent] vs. Geoffrey Davey [Continental secretary] – appealed the circuit court rulings.

Late last September, the decision favoring the IRS on both counts was handed down by the Second Circuit Court of Appeals. In a nine-page decision, a three-judge panel gave the IRS access to "all relevant material" and not merely a form of that material for audit purposes.

In what appeared to be a statement of precedent for companies with computerized recordkeeping systems, the appeals court judges said:

"In this era of developing information storage technology, there is no conceivable reason to adopt a construction that would immunize companies with computer-based recordkeeping systems from IRS scrutiny.

"Such would not be in keeping with Congress' intention in enacting the section of the IRS code this case falls under."

The language in the IRS code, the court ruled, is sufficiently broad to cover data stored in the form of computer tape.

On the question of copies made from the original tapes, the judges decided the IRS "should not be required to rely on the taxpayer's affadavit that a printout accurately reproduces all information."

Countering Continental's argument of unnecessary inconvenience caused by relinquishing the original tapes, the court said "the taxpayer's suggestion that temporary removal of the original tapes by the IRS would unduly burden or unnecessarily interrupt the company's business is unsupported.

"On the contrary," the judges said, "Continental has had no real use for the tapes except as 'intermediate processing tools' for 30 days and it has retained them only to satisfy an IRS ruling that requires retention for auditing inspection" by the agency.

"In effect, the taxpayer argues that it may withhold the tapes from the very agency for which they are being retained because of the risk that [the IRS] may lose or destroy them. Such circular reasoning is unpersuasive," the court said.

On the question of bearing costs for duplication, the court stated, "For this billion-dollar company, which produces and stores some 200 tapes each year, the cost of duplicating the 37 tapes in question, estimated at approximately $1,305, would be minimal, representing but a small outlay in comparison with the other amount which the taxpayer expends annually in cooperating with the IRS."

# Medicaid Systems Under Attack

(Continued from Page 1)

recent bid evaluation process in the State of Washington, for example, according to the report.

Last year that state sought bids on the development and implementation of an MMIS. Two companies were judged to be qualified bidders, but after the proposals were evaluated the contractor whose proposal was selected asked for $4.5 million more than his competitor.

HEW staff members objected and HEW officials asked the National Bureau of Standards for an opinion. The bureau affirmed the award of the contract to the higher bidder, but raised questions about the fairness of the evaluation process.

The second issue of concern to the subcommittee is HEW's approval and certification of multiple computer systems within one state, the report said. Such "fragmented" systems duplicate development and then operations costs, of which the government pays such a high percentage.

"Where fragmented systems are approved, there is a very serious question as to whether information generated by each system can be easily assembled into consistent and comprehensive reports" for management review, the report said.

In addition, "the congressional intent behind the MMIS program clearly calls for numbers of states to join in the use of a single MMIS so as to avoid duplications of development and operating costs," it stated.

"Any ratification of multiple systems within a state would appear to contradict the intention of Congress to consolidate numbers of states around one MMIS unit."

Yet in Texas HEW recently approved operation of a two-part automated Medicaid program: one is administered by Group Hospital Services, Inc., the Dallas-based Blue Cross plan for the state which pays for hospital and physician services to Medicaid beneficiaries on a prepaid, at-risk basis; the other is handled by the State of Texas, which manages the drug and nursing home elements of the state Medicaid program.

An audit of these systems for certification and consequent federal funding showed the contractors could not produce the reports required for federal review.

Despite this HEW audit last January, the HEW associate administrator heading the OIS, Harold Wienberg, sent a memo to the state certifying its systems.

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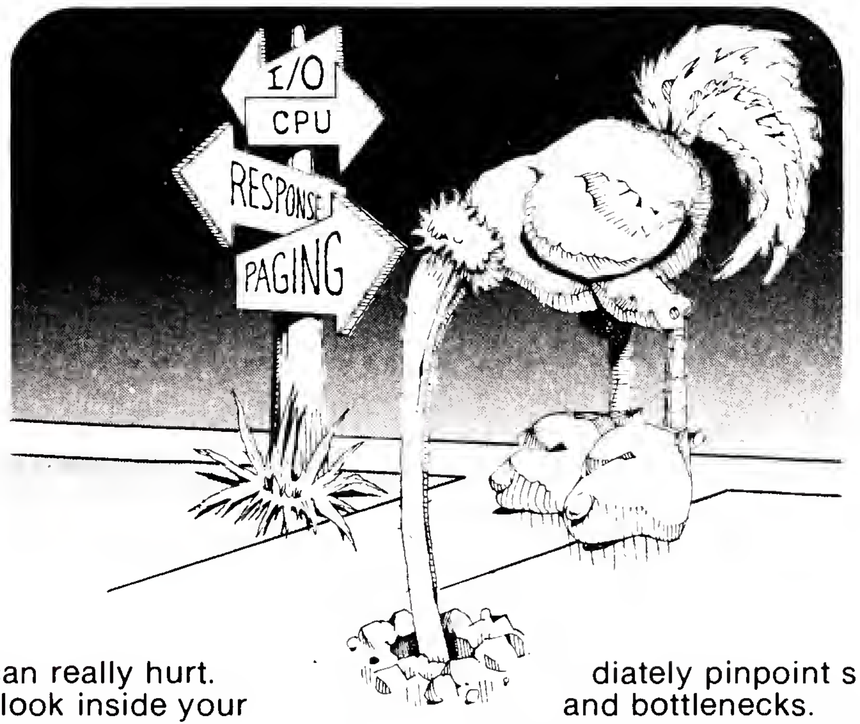

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# Public Packet Network Seen Best Alternative for User

(Continued from Page 1)

resources.

4. Elimination of many of the housekeeping chores associated with network management, such as sizing the network and selecting equipment, dealing with multiple vendors, maintaining the system and monitoring network utilization and performance.

With a leased private-line network, a user must install facilities in each remote location appropriate for the anticipated traffic load.

Since the utilization of interactive systems is somewhat difficult to predict, privately installed facilities are often mismatched to the requirements - having either too many or too few access ports in a remote location.

In contrast, for a computer on a public packet network the problem of having too much or not enough port capacity is eliminated. Peak traffic loads can be handled easily.

And, in terms of geographic availability, adding terminals in new locations requires no effort at all on the user's part.

Packet switching's greatest advantage is its flexibility. Typical private networks offer access to only one computer system or computer center (when a company may operate multiple systems at multiple centers), but the public packet network permits any terminal to access any computer system on the network.

Terminal user authentication is ordinarily performed by the customer computer system, although public packet networks also offer mechanisms for limiting access to specified network ports.

Additionally, the public packet network handles a wide range of terminal types and provides many options to the user on how each terminal type is to be handled. The user may specify parameters which determine the response time performance of the network; half- or full-duplex transmission; local character echoing by the network or remote echoing by the customer computer; the amount, if any, of padding to be inserted by the network; and whether the network should code convert characters into a standard form.

Some of the parameters are established when the customer's computer is initially connected to the network. Other parameters may be dynamically controlled by the customer's computer or, in some cases, by the terminal user.

### Quality of Service

In terms of availability of service, public packet networks offer higher availability than all but the most costly and sophisticated private networks.

First, the probability a terminal user will encounter a busy signal when dialing into an access port during the peak hour is appreciably higher in the case of the private network with few ports in each city than in the case of the public packet network with many ports in each city.

Second, when a line, multiplexer or concentrator failure in a private network can put all terminal users in a city out of business, similar equipment or line failures within a public packet network are invisible in most cases to the user.

The packet net is a highly interconnected distributed network with many computers at each major switching node.

Since user data is broken up into small segments, called packets, and dynamically routed along the best path at any given moment, a link outage in the backbone network is invisible to the user.

Moreover, each major switching center is equipped with one or more "hot standby" processors, which automatically take over should an active processor fail.

Finally, public packet networks utilize powerful error detection and correction techniques, reducing errors.

### Economy Factors

One of the basic appeals of a public packet network is the ability to have a nationwide communications network with virtually no investment. The time delay and the capital investment required to build and maintain a private network are largely eliminated.

For the Telenet Communications Corp. public packet net, for example, the monthly fixed costs to link a customer computer to the network consist of a flat rate for the leased channel port at a Telenet central office and for the access channel.

From here on, a customer has two options. The company can dial in to public access ports and pay for such ports by the minute.

Alternatively, private dial and leased channel ports for terminal users can be ordered at a fixed monthly rate.

If the choice is public dial-in facilities, the hourly charge will range from $1.40 to $4.80 per hour depending on the rate classification of each city. However, in cities where a company has many terminal users and high traffic volume, the network offers a sliding rate structure which brings the dial access charge down to 70 cents per hour.

These rates are substantially below long distance telephone or Wats charges and also compare very favorably to the hourly costs of typical multiplexer or concentrator network configurations.

It should be noted that when a terminal user dials into a local network access point and establishes a connection to a remote computer, the charges for such access are billed to the host computer.

While direct reduction in communications expenditures represents major savings, computer users also realize substantial additional savings resulting from the "network management function" performed by the public packet-switching network organization.

The design, implementation, operation and maintenance of a nationwide private data communications network requires a considerable amount of company resources.

It is necessary to forecast uncertain traffic volume; recruit data communications specialists; consider various network design alternatives (e.g., multiplexers or programmable concentrators); evaluate different types of modems, multiplexers and minicomputers; and incur capital investment costs for equipment.

Network management costs for such tasks are sometimes as large as the direct costs for network line facilities. Since the operator of a public packet-switching network performs these functions on behalf of the user, companies may realize additional savings.

*Mathison is vice-president of Telenet Communications Corp. in Washington, D.C.*

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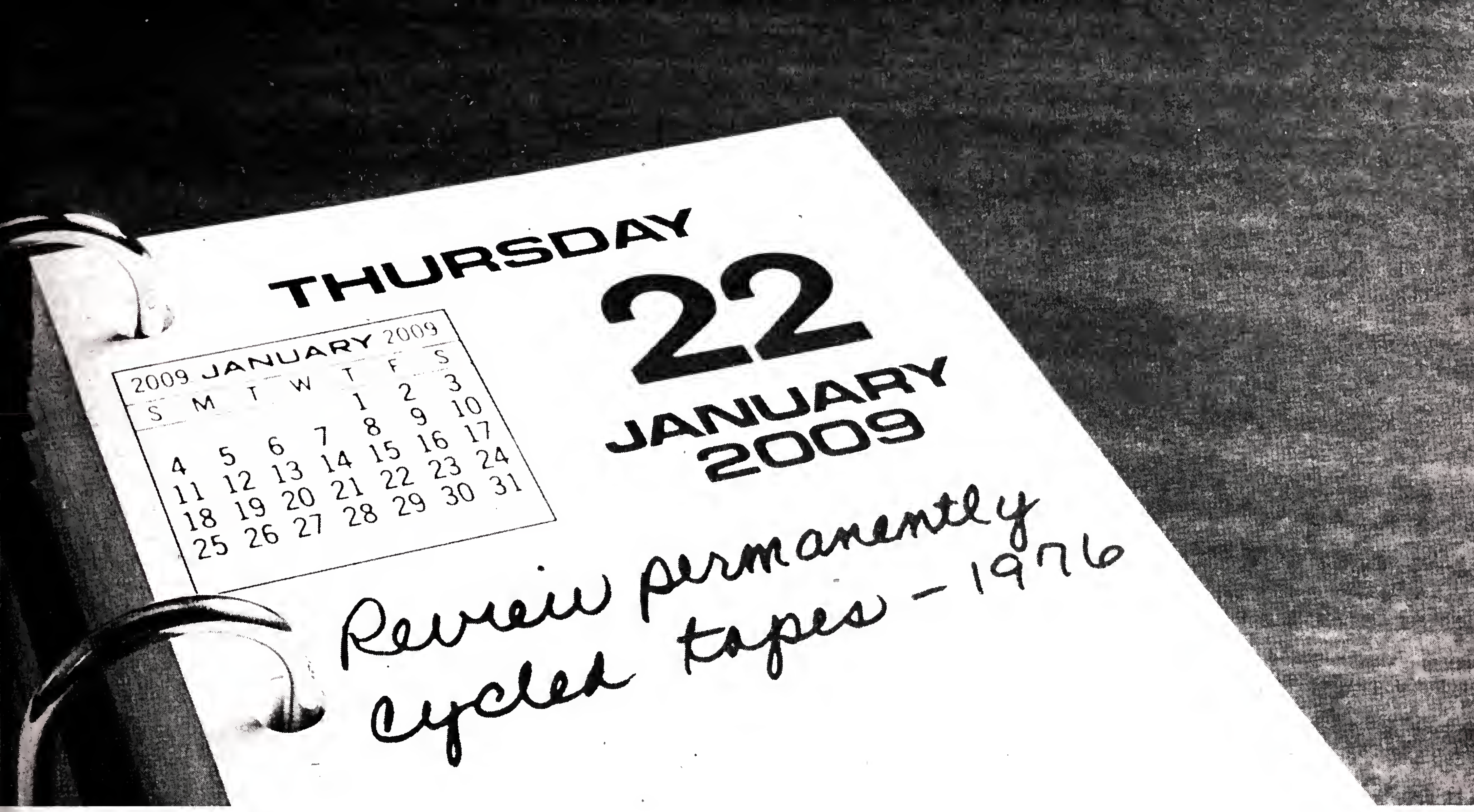

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# Number of DPers 'Significant' In Five UK White-Collar Unions

By a CW Staff Writer

ALEXANDRIA, Va. – Five white-collar unions in the UK already have "significant" DP memberships, Barry A. Wyld, a professor at Northern Ireland Polytechnic, said here recently.

They are the Association of Professional Executive, Clerical and Computer Staff (Apex), the Association of Scientific Technical and Managerial Staff (ASTMS), the National Association of Local Government Officials (Nalgo), the Union of Electrical Workers/Technical and Supervisory Staff (Tass) and the Society of Civil Servants (SCS).

Apex is very active in recruiting DP people working in data preparation, Wyld said. Of its total 1975 membership of 140,000, 10,000 were in DP and Apex planned to make DP one of its major growth areas in its 1976 recruitment campaign.

With 50 full-time employees backed by a team of highly qualified research specialists, Apex sponsors 16 members of Parliament, Wyld stated.

## ASTMS Militant

ASTMS boasts that "wherever there is a major computer installation handling data/information in a company, apart from the civil service, you will find ASTMS members," according to Wyld.

"We organize service engineers for all [UK] manufacturers – except, of course, IBM," ASTMS leaders have also said, and Wyld believes "they are working on that small problem."

With 14% of its 310,000 members in DP in 1975, ASTMS "is militant and aggressive and uses strikes to get what it wants," Wyld said.

The complete public sector is Nalgo's area of concern, and it has half a million members, of which 20,000 are in DP.

"This union has employed strike tactics where it has called out nonaffected operations staff as a lever to settle other members' claims," Wyld stated.

For example, Nalgo effectively closed down the gas industry in the UK for several days, and computer people were used as a lever to settle the dispute although it had nothing to do with computers, he said.

When Nalgo pulled out these DP members in sympathy with other workers, the dispute was settled within 84 hours, he noted.

Tass uses an approach much like that of ASTMS, Wyld said, noting approximately 10,000 DP workers were among its 114,094 members in 1975.

Valuing the strike method as a means of furthering members' interests when negotiations fail, Tass "is fully aware many of its members are employed in jobs where the withdrawal of their labor can be highly disruptive," he added.

As for the civil servants' organization, SCS, Wyld said the organization maintains a low profile and engages in one-day token strikes. The central government is Britain's largest computer user and the largest employer of computer staff, he pointed out, adding a conservative estimate shows about 7,000 of the government's DP employees are SCS members.

Noting that industrial disputes involving computer installations and companies were never mentioned in the press three years ago, Wyld said today it is rare for one week to pass without mention of an action taken by white-collar unions.

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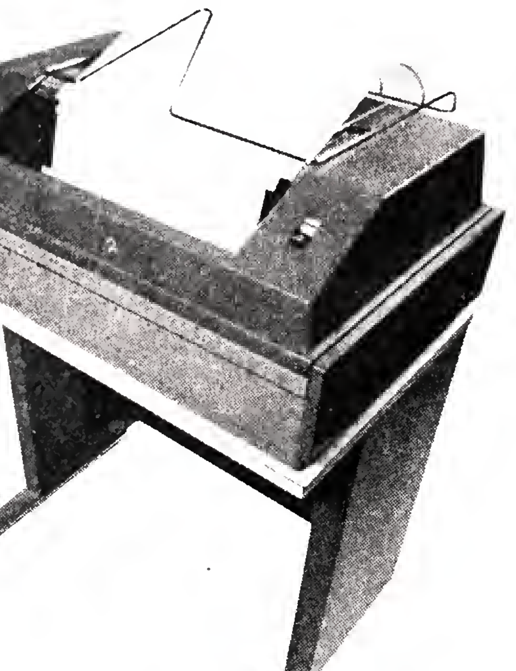

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### To Increase Guilds' Power

# UK Unions Pursuing DPers

By Edith Holmes

Of the CW Staff

ALEXANDRIA, Va. – The white-collar unions in the United Kingdom see the whole DP field as "ripe for picking," Barry A. Wyld, a professor at Northern Ireland Polytechnic, said here recently.

Not too long ago "the computer professional stood aloof from the usual framework of management and the trade unions," Wyld said. "Very few installations were unionized."

But now things are changing. White-collar unions are increasingly attractive to DP personnel in the UK, yet management appears totally unprepared for what lies ahead, he stated.

By controlling dissatisfied data preparation people – by far the largest group of DP workers in the UK – the unions have the power to disrupt an organization or even a whole industry, Wyld said.

Similar chaos can result from union control over much smaller and more highly skilled groups such as service engineers, he added.

Unlike UK management, the white-collar unions "are fully aware of the value of these workers as a key which can be used effectively in the settlement of a wide range of disputes," Wyld said.

"Furthermore, if the unions are to retain their political strength, then they must become more aggressive in courting the white-collar workers," he noted.

The function of the British trade union today remains what it was in the 19th Century: the protection of workers' interests, Wyld explained. Because they sponsor members of Parliament, the unions can wield substantial political power as well. Trade unions in the UK can have a considerable effect on the economy, he noted.

As of this year, the total DP work force of between 190,000 and 200,000 in the UK is spread over more than 40,000 installations, he estimated. The total membership of this group in white-collar unions is approximately 77,000.

Like other white-collar workers, DP people have "played an increasingly important role in the economic life of our nation," Wyld said. At the same time, however, "they have become worth less relative to manual and blue-collar workers."

The preferred terms of employment that once belonged to white-collar workers alone are now shared by the total work force, he noted.

## Pro-Union Factors

Two factors – office specialization and the use of computers – have contributed to the many workers' feelings of not being able to get ahead, which in turn leads to a pro-union attitude, Wyld maintained.

Office specialization has reduced the level of skill required and increased the number of dead-end jobs, he explained. "The introduction of capital-intensive computers has facilitated an assembly approach to work, demanding shiftworking."

In particular, programming "has become deskilled to such an extent that it may be described as a routine clerical function," he said, predicting this job function will disappear in the next 10 to 15 years.

Shiftworking is already the accepted procedure on the operations side of an installation, he added, and more complex operating systems have resulted in a faster work rate, requiring greater attention to detail.

"Data preparation is already the accepted subject of work study investigation," Wyld said.

For the systems analyst, the problem is "promotion blockage," he continued. The analyst finds it difficult to break into DP management and therefore does not see much of a career path ahead of him.

All of these factors contribute to trade growth, Wyld said. Dissatisfaction in the UK DP community also coincides with a decline in the total number of manual workers and a rapid increase in the number of white-collar workers.

"If the trade unions want to maintain their relative position in the power structure of the country and play an effective role, then they will have to continue their pressure on recruiting white-collar workers," Wyld contended.

DP people are an important target for union membership not only because their presence contributes to the overall strength of the union, but also because they can be used as bargaining levers, he said.

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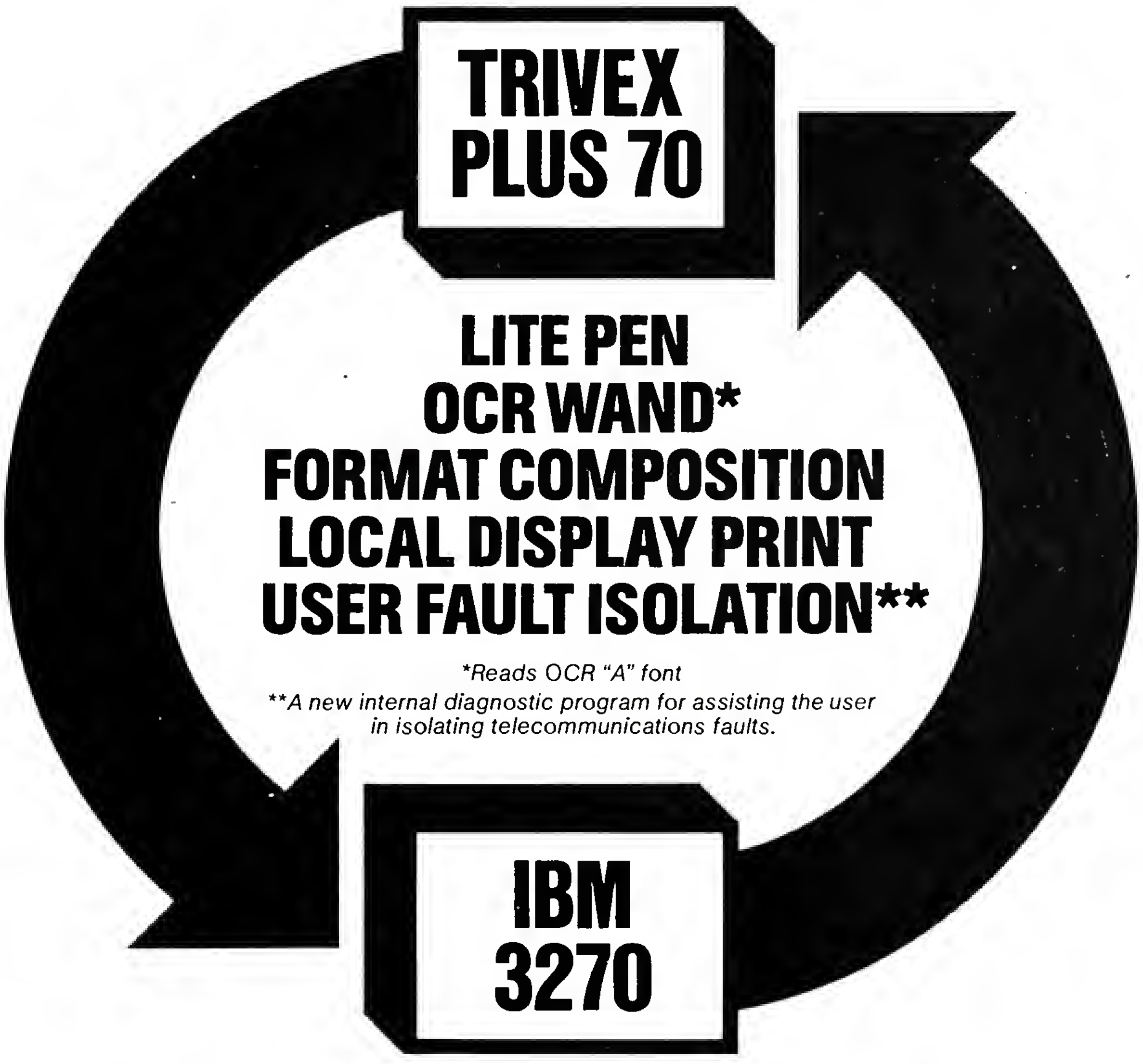

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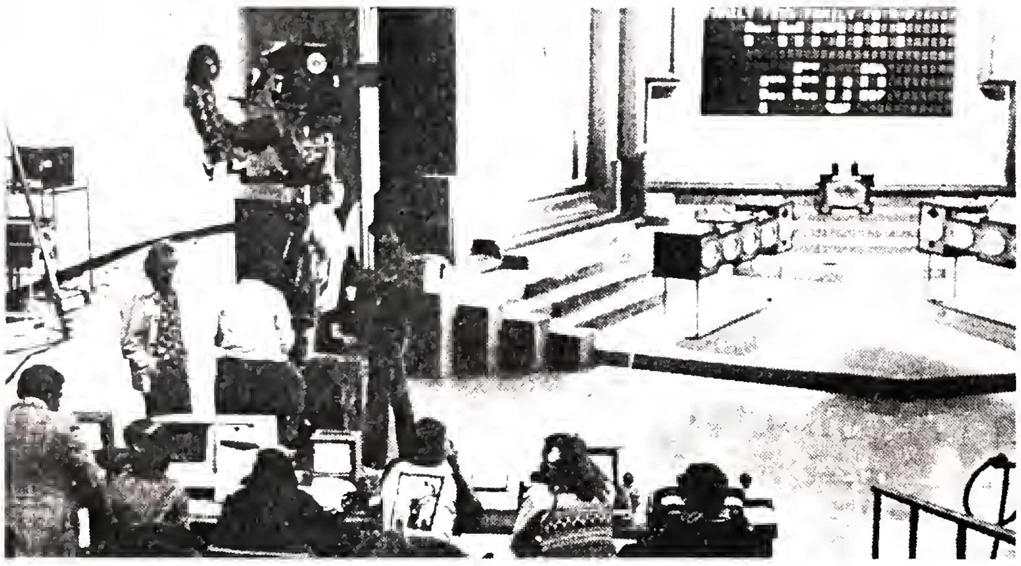
# Mini Intervenes in 'Family Feud' by Scoring Points

LOS ANGELES – Behind the scenes at ABC-TV here, a 32K Jacquard Systems minicomputer is keeping score and driving a giant signboard on "Family Feud," a new game show.



A mini makes more than a cameo appearance on 'Family Feud.'

Pertec Computer Corp. FD-500 flexible disks store the data, and instructions and messages are entered via a Jacquard CRT.

In addition to scoring instructions, the program stores up to 1,000 prepared messages, such as "Family Feud," in very large letters. These messages are shown between rounds of the game.

The sign is composed of 8,400 disk-shaped magnetic dots, yellow on one side and black on the other. By controlling which side faces the camera, hundreds of words, numbers and combinations can be created.

Families appearing on the show compete for points by answering a series of questions. The answers that win the most points are the ones which are most "popular," judging from a survey of 100 people taken before the show and then processed by computer.

These appear, with their assigned points, on the board during the game.

The sign was built by Ferranti-Packard Ltd. of Toronto.

# DP Helping Swedish Families Gain Better Sense of Identity

STOCKHOLM – About 60% of Sweden's eight million people share only 150 surnames, which makes searching through a telephone book to find any one of the 380,000 Johanssons, 370,000 Anderssons, 239,000 Nilssons or 209,000 Karlssons a nerve-wracking experience at best.

The Swedish government is attempting to solve this problem with the help of a computer. The system is being used to compose and publish books of new names which Swedes may choose to adopt as their own.

### Combinations Created

Existing Swedish words and local and regional place names stored in a data base are generated into all possible combinations resulting in names like "Hokflod," which translates to "wild bird river."

Although the Swedish government has been offering new names for the past 30 years, the computer was brought in only recently.

About 5,000 Swedes apply for new names each year. Total processing costs for a name change are reported to be about $50.

# Privacy Commission Sets Public Hearings

WASHINGTON, D.C. – The Privacy Protection Study Commission will hold public hearings on employment and personnel record-keeping practices here on Dec. 9-10 and Dec. 16-17.

Hearings will begin at 9:30 a.m. each day in Room 2318 of the Rayburn House Office Building.

The hearings are part of the commission's inquiry into the desirability of extending the principles and requirements of the Privacy Act of 1974 to the private sector and state and local governments.

Under scrutiny will be the employment and personnel recordkeeping practices of private industry, state and local governments, private nonprofit organizations, employment agencies, consumer investigative companies, private investigating agencies and labor unions.

Additional information on the hearings is available from the commission at 2120 L Street N.W., Washington, D.C. 20506.

# *EFT Commission to Address Issue of Sharing Systems*

WASHINGTON, D.C. – The National Commission on Electronic Fund Transfers (EFT) will hold hearings on issues impacting the sharing of EFT systems on Dec. 9-10, in Room 2128 of the Rayburn House Office Building here.

Witnesses will be asked why EFT systems should be shared; what the impact on consumers would be if sharing were prohibited, permitted or mandated; which institutions and organizations should be required to share; and who should legislate sharing.

Further information is available from the commission at 1000 Connecticut Ave. N.W., Washington, D.C. 20036.

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Our ALDs have 8 diagnostic LED indicators. Loopbacks include local analog and local digital.

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| | | 1st Year Savings | Succeeding Years Savings | |
| 103F | ALD | $ 148 | $ 648/yr | 40 |
| 202 | ALD | 270 | 770/yr | 40 |
| 201C | SLD | 462 | 1,512/yr | 25 |
| 208A | SLD | 1 706 | 2.796/yr | 16 |
| 209A | SLD | 4 316 | 5.676/yr | 10 |
| 301 (19.2)** | SLD | 8.564 | 10.164/yr | 10 |

*An average of the savings in Boston, New Jersey, Michigan, and Wash. D.C.
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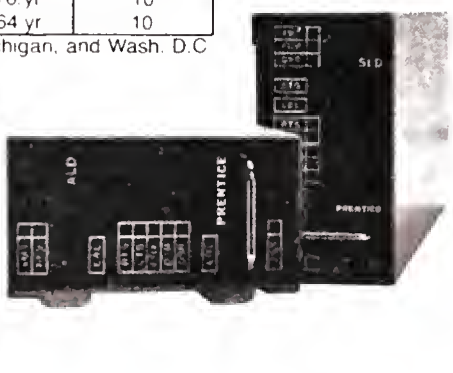

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# Calendar

Nov. 29-Dec.1, NEW YORK '76 **Input/Output Systems Seminar.** Contact: Input/Output Systems Association, P.O. Box 1333, Stamford, Conn. 06904.

Dec. 2-3, Washington, D.C. **Formatted File Systems Commercial Users Group 1976 Meeting.** Contact: Carolyn Shamlin, 1860 Lincoln St., Suite 700, Denver, Colo. 80203.

Dec. 6-7, Washington, D.C. **Life Cycle Costs and Logistics Alternatives,** sponsored by the American Institute of Aeronautics and Astronautics. Contact: Helen Flourny, 444 W. Ocean Blvd., Suite 1403, P.O. Box 1710, Long Beach, Calif. 90801.

Dec. 6-8, San Francisco – **Computer Software Conference,** sponsored by the American Institute of Industrial Engineers (AIIE). Contact: Diane Summers, AIIE, Computer and Information Systems Division, P.O. Box 3727, Santa Monica, Calif. 90403.

Dec. 6-9, Las Vegas – **Fall Digital Equipment Computer Users Society (Decus) Meeting.** Contact: David Simler, Decus, Maynard, Mass. 01754.

Dec. 7-8, Washington, D.C. – **1976 Transportation Data Coordinating Committee (TDC) National Transportation Systems Forum and Exhibit.** Contact: TDCC, 1101 17th St. N.W., Suite 309, Washington, D.C. 20036.

Dec. 7-10, Chicago – **Distributed Data Processing Conference,** sponsored by the American Institute of Industrial Engineers.

Dec. 7-15, Moscow – Sovexpo '77, sponsored by Clapp & Poliak, Inc. Contact: Clapp & Poliak, Inc., 245 Park Ave., New York, N.Y. 10017.

Dec. 8-10, Orlando, Fla. – **College and University Systems Exchange (Cause) National Conference.** Contact: Cause, 737 29th St., Boulder, Colo. 80303.

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The Adage GT/2250 interactive graphics display system is a plug-to-plug, key-for-key, low-cost second source for the IBM 2250/3. With the extra performance features you would expect from the recognized leader in computer graphics technology.

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# NCC to Focus on Personal Computing

MONTVALE, N.J. – A major program on computing will be featured as part of the 1977 National Computer Conference (NCC) to be held in Dallas on June 13-16, according to an American Federation of Information Processing Societies (Afips) spokeswoman.

A personal computing fair will feature exhibits of individually-owned projects that will be judged in several areas such as hardware, software and applications.

For information on participating in the fair, contact Harold A. Mauch, Percom Data Co., 4021 Windsor, Garland, Texas 75042.

## Societies/ User Groups

Papers and proposals for two days of panel sessions are currently being solicited on personal computing software, hardware designs, trends for personal computing, influence of the personal computing movement on the computer industry and on computer science education, innovative applications of personal computing systems, standards for personal computing products and forecasting of trends in personal computing.

Deadline for all submissions is Dec. 1, 1976. For a copy of the official "call for papers" and "paper guidelines," contact Dr. Robert R. Korfhage, '77 NCC Program Chairman, Department of Computer Science, Southern Methodist University, Dallas, Texas 75275.

A personal computing club congress will allow representatives of clubs to exchange ideas relating to club activities and problems, the spokeswoman indicated.

Information on exhibit space may be obtained by contacting Carol Sturgeon, manager of conference operations, Afips, 210 Summit Ave., Montvale, N.J. 07645.

# AEDS Annual Programming Contest Set for Students in Grades 7-12

WASHINGTON, D.C. – The Association for Educational Data Systems (AEDS) will hold its 14th annual computer programming contest for students in grades 7-12.

Entries are welcome in the following categories: business, biological and physical sciences, computer art, computer science, games, humanities and mathematics. Deadline for entries is March 1, 1977.

The grand prize is a $100 U.S. Savings Bond plus a minimum $300 travel grant to attend the 1977 AEDS Convention in Fort Worth, Texas on April 25-29.

The winning student's sponsor also will receive an all-expense paid trip to the convention.

Category winners will receive a $50 U.S. savings bond.

Team as well as individual entries may be submitted, but in the event a team wins, only one member may travel expenses-paid to the conference.

For additional information, contact E. Keith Smelser, 5040 Bald Eagle Ave., White Bear Lake, Minn. 55110.

# SIC/EFT Slates Panel Discussion

NEW YORK – A panel of five bankers will give a presentation on the functions and services of the New York Automated Clearing House on Dec. 9.

The program, which is sponsored by the Special Interest Committee on Electronic Funds Transfer (SIC/EFT), will begin at 5:30 p.m. at the Hotel Lexington here.

The panel will be chaired by George C. White Jr., vice-president, The Chase Manhattan Bank, and participants will include James O. Aston, assistant vice-president, Federal Reserve Bank of New York; Charles W. Donaldson, vice-president, Manufacturers Hanover Trust Co.; Santo E. Galdi, vice-president, United Jersey Bank; and Alexander V.R. Halsey, senior vice-president, Morgan Guaranty Trust Co.

For details, contact Bob Duffy at the New York City Chapter, P.O. Box 245, New York, N.Y. 10017.

# *Singer Users Selected For Leadership Posts*

HARTFORD, Conn. – Milford Munson was selected vice-president and Shirley Dyess was elected to the Board of Governors of Forum International, the Singer Information Systems users group.

The announcement was made at a meeting of the Board of Governors at the association's fall conference here recently.

Munson is data base administrator for the Materials Fabrication Division of Lawrence Livermore Laboratory.

Dyess is DP manager for Sue Ann, Inc. in Dallas.

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## *Micros Heralded as Way of Future*

# Mainframes, Minis Seen DP's Endangered Species

By Edith Holmes
Of the CW Staff

ALEXANDRIA, Va. The massive central computer "is a woolly mammoth whose time has passed" and minis as we know them today are doomed, according to Dan M. Bowers, technical editor of *Mini-Micro Systems*.

Micros will grow upward to become the basis of all product lines, Bowers predicted at a recent conference panel discussion here.

Lt. Cmdr. James F. Howick, chief of the U.S. Naval Operations' Information Systems Division, agreed.

Borrowing an analogy from Cmdr. Grace Hopper, Howick said "if we compare computing to the aircraft industry, then we are at about the Ford Trimotor level of technology.

"Micros are the jets in this industry, and they're coming," he added.

### Beast Not Dead

But the third panelist, Jack T. Lynch, director of advanced development for Burroughs Corp., argued the woolly beast isn't dead yet.

Large mainframes, traditionally used to manage data bases of increasing size, will continue to do so while the industry learns to partition data bases into pieces that processors on a chip can handle, he said.

In addition, large problems requiring considerable number crunching will still exist, Lynch stated. Weather prediction, plasma studies and wind tunnel or airplane test emulations will still need big computers to produce results in a short period of time.

Lynch acknowledged the development of micros and minis presents an interesting problem for the company whose job is to sell large mainframes. Ultimately, he agreed with Bowers and Howick that micros are the way of the future and will come about as fast as manufacturers can put increasing amounts of memory on a chip.

Word-processing and integrated systems that combine computer and communications technologies are two areas Lynch sees open to companies like IBM and AT&T, in addition to Burroughs. The opening of these areas, coupled with the time it will take for the micro to fully develop, means there is a future for large mainframes, he suggested.

In the mini- and micro-dominated future, however, Bowers predicted there will be "a shake-out of computer manufacturers." Those that survive will be a combination of the present minicomputer manufacturers and the semiconductor makers, he said.

Both Bowers and Howick agreed these events won't take place overnight. Howick pointed to one "disappointing aspect" of micros — the minimum software and support that comes with them.

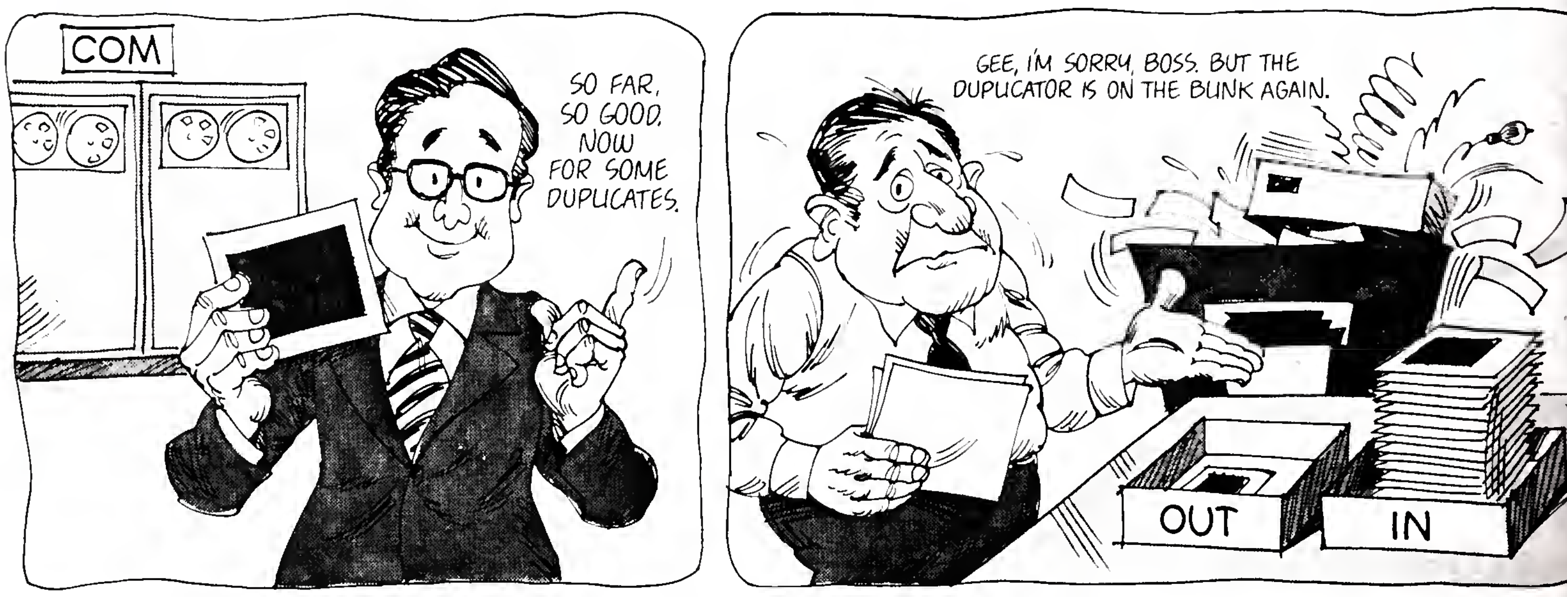
A lack of standardized software is one reason why micros can't compete with minis and maxis today, he said.

The profits the semiconductor manufacturer now makes from selling chips in quantities could be reduced as greater capabilities find their way onto single chips, Bowers added, noting lower profits could mean limited development of micros.

While Bowers looked at the growth of minis and micros as the way to bring computer power as many as four times closer to the user, Howick viewed the advent of such machines as a means to automate applications previously too expensive or too risky to put on a computer.

Distributed minis and the coming of micros promise service to the user, an ability to solve a wider range of problems with a smaller amount of programming skill and manageable system elements that will make problems easier to correct, Bowers said.

In addition, he noted, users will be able to make a better match between computer power and the applications to be performed.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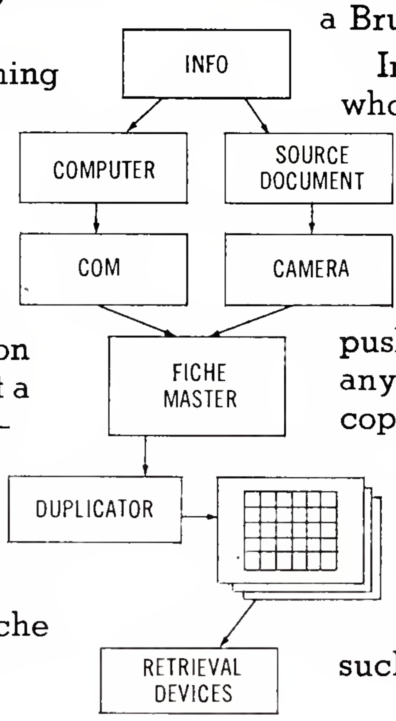


# Clear Writing Called Path to System Optimization

By Don Leavitt
Of the CW Staff

CINCINNATI – Improving the technical writing that surrounds any proposed or actual DP system is likely to be one of the best ways to improve the system itself because everyone concerned will have a clearer understanding of what is to be done when, how and by whom.

While that may seem obvious, it may also be one of the hardest improvements to develop, according to Linda Hinke of Cincom Systems, Inc.'s Federal Division.

Bad writing habits are hard to break, she told a session at the vendor's user meeting held here recently, but there are ways of doing it.

First of all, no matter what the purpose of the writing, the writer should consider the reader, she said.

"Watch out for peopleless writing," she warned, adding that personal references in conjunction with things to be done "are perfectly all right – and certainly better than impersonal, passive constructions to which no one can relate."

## The Human Connection

Even when the reader is taken into account, a lot of technical writing suffers from wordiness, Hinke continued. Sheer volumes of words can overwhelm the person it is supposed to help and defeat whatever purpose the writing originally had.

Finally, she said, even if the writing considers the reader and is of reasonable size, it can lose its value if it is poorly planned or filled with ambiguous or needless words.

To illustrate the need to recognize the reader, Hinke set up an experiment, asking each member of the audience to write down a description of a diagram she distributed.

At the end of the writing time, she explained two different diagrams had been passed out. Then she asked half the audience to draw the diagrams of the other half – based solely on the written descriptions provided by the other participants.

Although some of the new drawings were close to the originals, most were not because, as Hinke noted, the written descriptions were not complete. They often omitted vital points obvious to the writer since the diagram was right there, but completely unavailable to the person attempting to work from the narrative description.

### 'Cool It'

In a more serious vein, Hinke urged attendees to plan whatever writing they had to do, do the writing and then "cool it" for a while – "put it aside for an hour, a day or a week or more" – before revising it or passing it along.

The planning phase involves organizing and outlining what is to be covered in the writing, she said. The organization would vary depending on the subject: Recounting a chain of events would lend itself to a time-order sequence, she explained, whereas describing a multicenter DP operation might be easier following a spatial or place order.

There are valid reasons for ordering things in either increasing or decreasing importance, but in any case an outline is "almost indispensible" to doing a good job, she said.

By starting with an outline, she went on, the writer has a much easier time revising the writing altogether or changing the sequence of items without changing everything.

"You can be sure the important parts are where you feel they should be, or you can put them in the right place after all," she added.

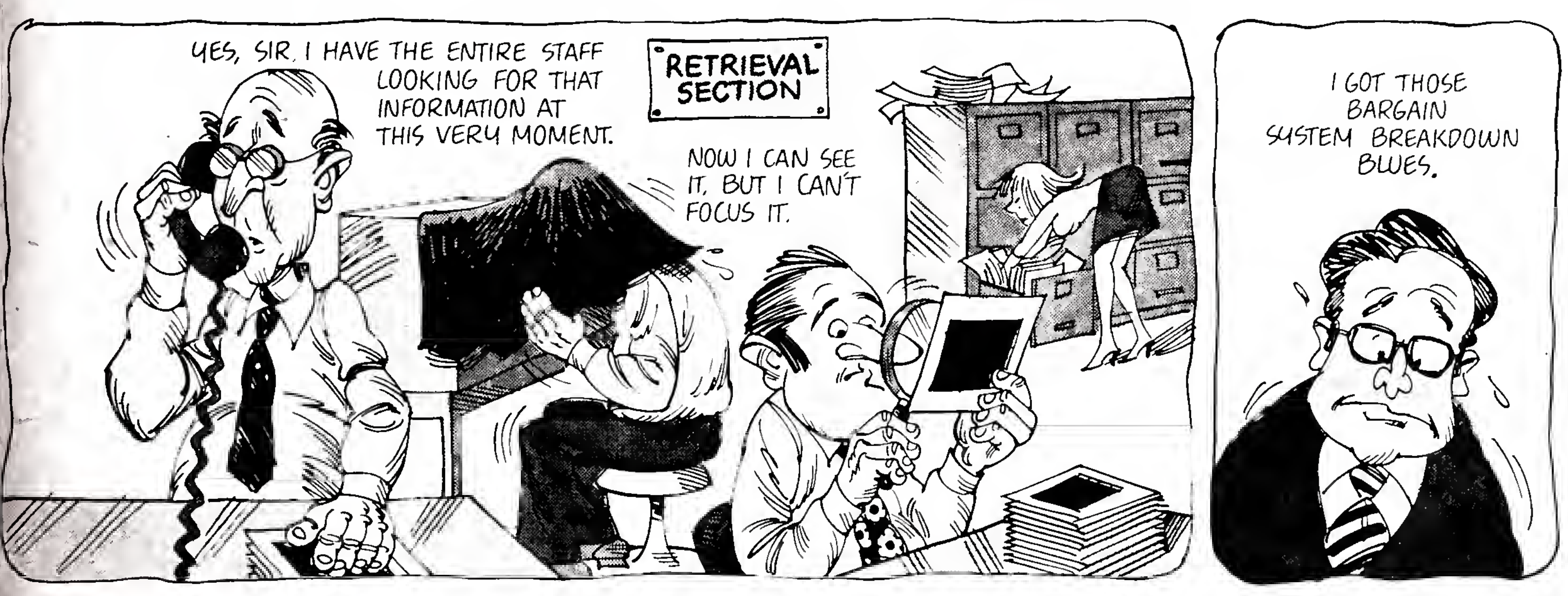
The review after the writing and the cooling-off period should be quite organized, Hinke said. Writers should check first to see all the pertinent information – and nothing extraneous – is there, then see if the writing is clear, she added.

After that, the writer should be concerned about grammar, spelling, construction and verb tenses – "but those niceties won't mean much if the needed information isn't there first."

Checking to see if the number of words can be reduced and if the writing style can be changed should wrap up the review process, Hinke said.

Moving to the subject of ambiguous and needless words, Hinke distributed handouts describing eight types of problems and a number of suggested ways around them. The list of problems ranged from "fog words" – technically accurate but verbose and often overused – through tautology into what Hinke called "dilute verbs" and "hiccups" – the use of unnecessary prepositions and adverbs.

Roundabout constructions, false elegance and pointless words and phrases were also condemned by Hinke, who ended her presentation with a list of good "action verbs" she urged her audience to use in place of the "heavy" multisyllable verbs that have taken over so much technical writing today.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# Editorial

## *Washington Simmering, Bell Cooking*

With the introduction of its latest data communications devices, AT&T has served notice that it intends to be a vigorous competitor. At the same time, however, the products raise some new questions for users.

The Bell 212A data set is a two-wire, full-duplex unit that follows the technology pioneered by Vadic Corp. in 1974 and also introduced earlier this year by Universal Data Systems. But the 212A uses different technical standards and is therefore not compatible with either of the two independent modems.

This situation is not unique, of course, especially in the higher speed modem arena where differing modulation schemes often make various vendors' data sets incompatible with each other.

There are some unique precedents in this low-speed area, however. Full-duplex 1,200 bit/sec data transmission was developed by non-Bell vendors. Bell carefully evaluated the Vadic modem in its Purchased Products Division offering vague promises to Vadic that the device might be adopted by Bell companies.

In the end, Bell Labs developed a different modem which AT&T spokesmen say was designed specifically to be compatible with earlier Bell System 100 series data sets.

It would be much easier for users if there were compatibility among these modems so the 212A could be connected into a network already operating with Vadic VA 3400 modems. Instead, users will have to choose which unit best meets their needs.

There is no reason technical differences must exist which preclude equipment compatibility. Each supplier claims to have a superior product and it will be up to the marketplace to sift out the better features.

Meanwhile, the desires of the user go virtually unnoticed, except for the fact the customer has one more major supplier from which to choose.

In the same vein, the AT&T 43 Teleprinter puts the Bell System squarely into the portable terminal area. AT&T has chosen the plug-and-jack arrangement standardized by the Federal Communications Commission (FCC) to connect this new unit. On the surface, AT&T spokesmen say they are simply complying with the new certification/registration program.

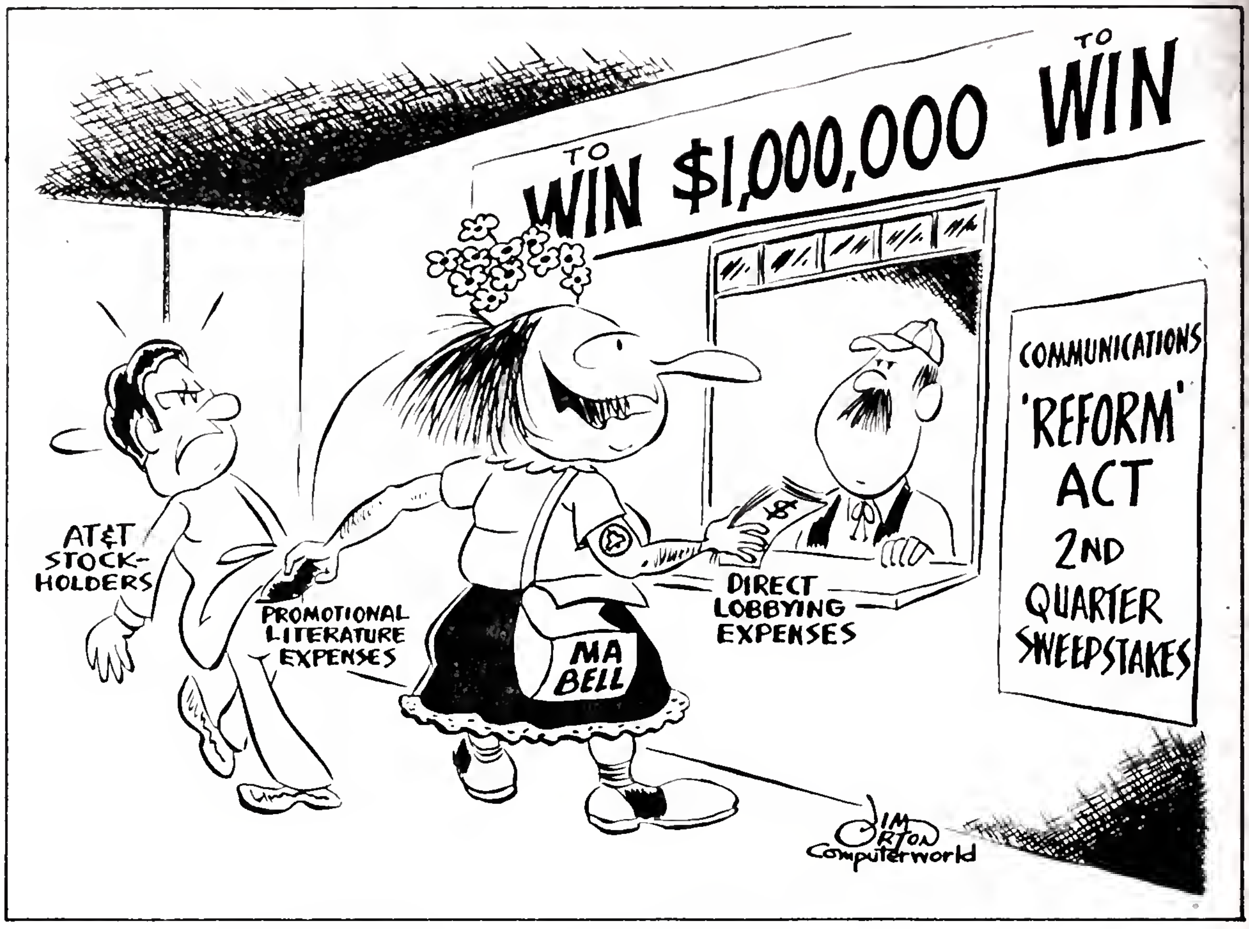
Bell has now used the plug-and-jack program – designed to simplify interconnection for its competitors – as a vehicle to enter the portable terminal market. That may not be quite what the FCC had in mind, but it demonstrates the aggressive manner in which AT&T intends to compete in the future.

This teleprinter shows Bell will not sit back while its legislative proposals simmer on the Washington back burner. It still has many equipment options it can exploit.

AT&T, Bell Labs and Western Electric are a tremendously powerful monopoly combination operating under the protection of the regulatory umbrella. This is one of the important competitive questions that Congress should examine when it reconvenes after the New Year.

It also forms the basis of the Justice Department antitrust charges against the Bell System.

It is to be hoped that users will not become the forgotten third party in the important upcoming proceedings.



*'That's $600,000 out-of-purse and $400,000 out-of-pocket!'*

# Letters to the Editor

## What a Difference a Day Makes, Twenty-Four Little Hours...

David Schechter [CW, Nov. 8] overlooked the fact that calendar dates are most frequently and properly input and output in day of month/month/year format and not in day of year/year format.

His observations concerning the utility of internally storing dates in serial form being quite valid, I recommend three articles from the *Communications of the ACM* on date algorithms: Fliegel's and Van Flandern's "A Machine Algorithm for Processing Calendar Dates" (October 1968); Stone's "Tableless Date Conversion, Algorithm 398" (October 1970); and Tantzen's "Conversions Between Calendar Date and Julian Day Number, Algorithm 199" (August 1963)

Arthur F. Kaupe Jr.

Wilton, Conn.

## Bring the Sun and the Flowers...

I found David Schechter's article very stimulating. However, I take exception to the formula used to convert a five-digit number (FDN) to a Julian date.

The correct formula should be:

`DDD = FDN - integer ((YY * 365.25) - 25)`

I believe the error I discovered is only an oversight on *Computerworld*'s part.

Frederick P. Hamble Jr.

New York, N.Y.

## Where There Used to Be Rain

Although interesting and perhaps useful, David Schechter's reader commentary, "Storage of Date Information Lacks Inventiveness," may cause confusion and lead to errors.

Besides the fact that the formula was given wrong, I'm sure your readers will be glad to know Dec. 31, 1988 *is* a Sunday. Of course, Schechter must have meant Dec. 31, 1899 was a Sunday

Thomas W. Dowling

San Bruno, Calif.

## Straight from the Source's Mouth

Why is it necessary for *Computerworld*'s writers to riddle their articles with attributions?

The Oct. 25 issue contained an article titled "Modularity Provides Key to Itel Advanced Systems." The article contained the following attributions:

- "Itel said" (used twice)
- "Itel claimed" (used twice)
- "Itel noted"
- "an Itel spokesman noted"
- "he noted"
- "the company said" (used twice)
- "the spokesman noted" (used twice)
- "the firm noted"
- "the firm claimed"
- "according to the firm"
- "Itel is assuming" (used twice)
- "he added" (used twice)

Does CW assume the reader would not believe the facts presented in such articles were it not for the attribution or do you deliberately sprinkle your paper with these annoying attributions?

Anthony R. Dilworth

New York, N.Y.

**Since Computerworld does not have the facilities to test and evaluate equipment and services, attributions are used to support claims that are reported, the editor said.**

# Data Past

### Five Years Ago
### Dec. 1, 1971

NEW YORK – Univac bought the RCA customer base, and the two companies gave themselves until Dec. 17 to iron out the details of the purchase.

Cash payment on Jan. 2 was to be $70 million, and additional payments based on "varying percentage of future revenues," expected to be in the area of $30 million to $60 million, would be made over the next five years.

– – –

SAN FRANCISCO – The legality of data banking personal information was at issue here as two social workers refused to give their files to the state for computer entry. The two refused to divulge information on such items as alcoholism, sex offenses or mental illnesses.

The social workers were suspended without pay for five days and then filed suit against the California State Department of Social Welfare. One of their American Civil Liberties Union attorneys noted California law permitted state employees to disobey an unlawful order.

### Eight Years Ago
### Dec. 4, 1968

WASHINGTON, D.C. – The question of the patentability of computer programs appeared to be headed for a quick decision when the Court of Patent Appeals decided computer programs could be proper subject matter for patents – a holding directly opposite to the viewpoint expressed by the Patent Office in guidelines issued last month.

– – –

WASHINGTON, D.C. – USA Standard Cobol was adopted by the Department of Defense. All Cobol compilers delivered to the department after Jan. 1, 1970 had to provide for the full standard or for one of the new standard subsets.

# An Open Letter to President-Elect Carter

## The Human Connection

By Jack Stone

Special to Computerworld

Dear Mr. Carter:

Your remarkable victory in the Presidential election deserves a rousing cheer!

During your campaign you spoke eloquently of the needs for reorganizing the executive branch of our government.

You were very clear in your characterization of the current establishment when your speeches included such terms as "nonresponsive," "bureaucratic," "disorganized," "wasteful" and "inefficient."

You expressed great determination to effect change by bringing proper management to the federal establishment.

I strongly agree with your assessment of Federal government operations, particularly as it applies to the management and executive control of government computer centers.

Many of us who have had business dealings with DP centers have developed a sense of despair and disillusionment about the past failures of federal DP.

Now we are recovering some lost hopes from the impending personnel and organizational changes.

### Current Situation

What is the current situation in the federal data centers? On the positive side, much intense progress has been made over the years.

The departments have institutionalized DP operations, allocated substantial resources to DP tasks, developed strong in-house technical personnel and sought to exploit new technologies.

Furthermore, much credit is due to the Federal government for building the industry both through its extensive funding of technology R&D and by virtue of its position as the world's largest DP customer.

On the negative side, managerial effectiveness of like departments and staff groups causes grave concern. Troublesome stories of serious management failures run rampant through the trade and public press.

Continuing reports tell of massive welfare overpayments; hardware procurement irregularities; proliferation of underutilized mainframes, including some on lease which are still warehoused; questionable validity of certain global computer/communications systems; inadequate or nonexistent control and evaluation mechanisms; the absence of cost justification studies for new systems; and many, many more.

A recent article published in a magazine for government executives stated the problem succinctly: the federal centers are in a mess.

### Complexities Exceed Capabilities

Why has this situation developed? In brief, because the technology and system complexities have outgrown the capabilities of current federal executives to manage and control the operations.

Pressures for new applications, new capabilities and new extensions have forced the rapid-fire installation of one new technology after the other, without breathing space or time for sensible planning.

The government DP executive, regardless of reasons why, has been consumed with the day-to-day problems of getting the machinery up and running and getting the work out the door.

He has not organized properly to bring an orderly, planned approach to his DP function. He has not brought proven management techniques into his DP world. And perhaps, most discouraging, he has not provided the type of leadership DP personnel need and seek.

The results? About what you would expect: insufficient use of hardware; chronic user dissatisfaction; low employee morale and productivity; duplication and overlapping efforts; poor supervisory attitudes; and desires from middle management for quick promotions – up but out of DP!

It is not my intention to single out the federal computing community as the only one with management problems.

A recent article in a prestigious journal for business executives pointed out the large corporations are also searching for answers to serious problems in their DP departments; the article indicated that DP managers had the highest turnover rate last year of any management group in American industry.

It is only that one can't help but be particularly sensitive to the almost unbelievable magnitude of the waste of human effort, machine time and dollars in federal DP – particularly when those are taxpayers' dollars.

What can be done about the current situation at federal DP executive levels? Perhaps the best way I can communicate my approach to this situation is to relate the sense of an encounter I had with a Federal government DP employee several months ago.

I had just completed delivering a lecture to members of one of the DP professional societies (related to one of my favorite themes, "DP managers should stop firefighting, and start managing") and was sitting down at one of the luncheon tables when a man jostled his way through the group, edged out the person next to me and sat alongside.

He first introduced himself as a government DP systems analyst and rather anxiously explained he wanted very much to obtain my views on a serious problem at his agency.

"Firefighting at our center is a gross oversimplification," he said. "We live in total chaos. Projects are defined without our input, manpower allocated without our knowledge, deadlines set without our agreement and hardware hauled in without our training. What can we do?

### Guidelines Proposed

I answered, "Let me give you some guidelines that my parents gave me years ago, which I have found particularly useful in my own career.

"First, if you don't know what you're doing, don't do anything.

"Second, if you think you know what you're doing, try it, but be sure to learn from your mistakes.

"Third, don't take on any new tasks until you have made a success of the old ones.

"Fourth, when you take on a new task, set your goals of excellence higher than those of the last task."

*(Continued on Page 22)*

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# Readers Get to the Seat of the Overbooking Problem

## The Taylor Report

By

Alan Taylor, CDP

Raphael Murphy Jr. is a bank examiner based in Boston. He has also been an airline no-show statistic.

Murphy explained why he became a no-show:

"I purchased a ticket two months prior to departure. Arriving at the airport in ample time before check-in, I nevertheless was at the end of a long line. American Airlines denied boarding to me and eight others. Needless to say, I have never utilized the services of American Airlines again. My return trip was on Delta Airlines. American was not notified of my cancellation."

Was he correct? Well, under the current system, the Delta reservation might not have been honored either, so the American reservation was perhaps a necessary backup.

There are no good facilities for canceling flights after you are safely on a plane (Eastern Airlines used to offer them on the back of shuttle boarding passes, but no longer). So, I don't think Murphy can be considered dishonest.

Particularly important are the number of people who must have been overbooked (at least nine); the fact everyone turned up early and that Murphy, at least, booked early.

All this adds up to using overbooking parameters based on annual statistics for something like the last flight out of Boston to Miami on Christmas Eve.

### Others Shed Some Light

Murphy was not the only reader who added some new light to the overbooking problem. John Trotter pointed out one key problem had been overlooked.

The overbooking problem arose, he argued, not from no-shows alone, but from the fact each airline responded to no-shows by itself and not in concert with the other airlines on an industry-wide basis.

According to Trotter, "The only viable solution for an individual airline is overbooking. Any cancellation penalties imposed by a single carrier would have allowed its competitors to eat it alive. The fair solution . . . is one that must be adopted industry-wide, by all carriers alike."

### Can Carrier Go Alone?

The position for the individual carrier may not be as gloomy or hopeless as Trotter stated, judging by the experiences of Whitney Johnson, director of management information systems at Northern Michigan University.

Johnson told me he previously lived in Richmond, Va. and travelled considerably on Eastern. After finding that a flight was fully-booked in first and coach, he found "leisure class" still open.

"Upon investigation, I found that leisure class was really responsible for the overbooking problem," Johnson said. "A leisure-class booking does not guarantee a seat – the passenger gambles and the airline gambles, but both know it. The fare is the same as coach.

"A leisure-class passenger must check in at least 20 minutes before flight time, but only boards after all confirmed seat holders have boarded – and then only if there is space. If he doesn't get to board, he goes free on the next available flight."

Johnson likes this and requests leisure class whenever there is a backup flight later in the day that would get him to his destination in a reasonable time.

### Motels, Not Theaters

The question of a convincing analogy for the airline problem was also dealt with and the "theater ticket" equivalent to the "airline seat" theory was rejected by many readers on various grounds.

Instead, everyone seemed to opt for the hotel/motel room with the cancellable-if-you-don't-show-up option and guaranteed reservation system.

Steve Ryder of Austin, Texas, was one who thought this was the seat of the problem.

> *'The only viable solution for an individual is overbooking. Any cancellation penalties imposed by the carrier would have allowed its competitors to eat it alive.'*

According to Ryder, "The real problem is the lack of ability for a passenger to obtain a guaranteed seat. I suggest that this type of ticket be made available [at the regular rate] to anyone willing to prepay the ticket and voluntarily waive cancellation rights.

"Thus the consumer has the choice, if willing to pay the penalty, of getting a really confirmed seat. The rest of us can continue to use the system that has worked well for us in the past."

### No-Show Blacklist

S.C.R. Morling, a senior project analyst in Florham Park, N.J., has a hankering to continue using the current system in the same way that Ryder has, but he came up with an alternative to Ryder's solution.

"It is not beyond the realm of possibility to conceive a blacklist of no-shows, Morling said. "These people could be subjected to Mr. Everest's plan."

Other readers seemed to feel the problem was deeper – and that what was being regarded by Morling and others as "convenience" was something more. Miles Fidelman of Boston pointed out single bookings have been missed by him on numerous occasions.

"Ground access to Logan [Boston's airport] is notoriously variable," he charged.

The frequency of the mention of changed plans, schedules, etc., although muted, seemed to me to be significant in defining the system problem involved here.

The airlines have to increase seat loads in the face of competition and when substantial travel – particularly business – is aimed at achieving some goal, rather than attending a specific event.

### Event vs. Goal

Event-type travel can be forecast with high precision; aim-type travel just cannot.

A businessman may negotiate everything on the first evening over dinner and, if so, he wants to get back as soon as possible.

Similarly, if after two days the goal is still not achieved, he may want to linger around to settle matters.

The timing of his return flight is unforecastable to this-flight, that-flight precision. All he really knows is that he wants to get home before the weekend. And that is what the airlines have to cope with.

No-shows themselves are apparently a secondary product of the system that the airlines have evolved to face this situation – the no-penalty cancellation (to prevent competitive advantage and to encourage greater travel).

Whether DP is involved in this corporate decision is not obvious and what readers think of it will be discussed later.

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## After Comparing AS/5, 370/158

# Figures Show Users Spend Less With Itel Than IBM

*The following is Itel Corp.'s response to James H. Conole's reader commentary, "Contracting With IBM May Be Cheaper in Short Run" [CW, Nov. 1].*

By Ken Hunt

Special to Computerworld

Itel introduced its Advanced System (AS) computer systems to the press on Oct. 14. At that meeting, Itel announced pricing of the AS/4 system at approximately $800,000 to $1 million, depending on memory size, and pricing of the AS/5 models at 65% of IBM's comparable 370/158 purchase prices.

We introduced a family of computers (two CPUs and six models) which are field-upgradable at the customer's site. This means a user can initially install a 1M-byte AS/4 and, over the years, grow it to a 16M-byte AS/5-3MP with 12 operational channels.

This approach is a departure from IBM's requirement that the user must physically trade a smaller CPU for a larger CPU to get the increased capability desired.

It is possible to discuss here frankly and accurately the conservative and educated manner in which Itel evaluates the price/performance of its AS models vs. IBM's 370/148 and 370/158 systems.

Price/performance is truly a measurement of the performance derived from a computer system for a relative price. The price paid for a computer system can be evaluated in a variety of ways, depending on the method of acquisition (purchase or lease) and the length of actual useful life (the number of years the system is retained by the initial user).

In the case of purchase or lease, the anticipated residual (market) value of the system plays a significant role. In the case of lease, it plays a major role because the system must have a reasonable residual value at the end of the lease term.

This is required in order for the lessor to claim the lease as "true lease," thereby qualifying him for the full ownership benefits of the investment tax credit, accelerated depreciation, etc. The lessor, in exchange for these benefits, passes along more favorable lease rates than could be obtained through traditional debt sources.

## Reader Commentary

Itel currently has tax-oriented financing available based upon the *lessor's* belief that the AS will have a reasonable residual value at the end of a seven-year lease term.

In the case of purchase, anticipated residual value plays a major part for those considering purchase because of its effect on a cash-flow analysis. The higher the actual residual value, the better the analysis (if the original purchase price is identical with two comparable systems).

Of course, if one system (such as the AS) is much less expensive at the outset and still maintains a reasonable residual at the end of its useful life to the initial user, then residual is not the dominant factor.

### Plug Compatibles Strength

In fact, it's probably appropriate at this time to stop and look at raw facts. Based upon actual history and current market values, plug-compatible products have held up very well in relation to their IBM counterparts. To cite some examples in the used equipment market:

- Plug-compatible 2314 disk drives sell for more than IBM 2314s.
- Plug-compatible 360/65 memory sells for almost double that of IBM 2365-1 core boxes.
- Plug-compatible 370/155 and 165 memory sell for 50% more than the IBM 3360-3 and 3360-5 core boxes.
- Plug-compatible 370/158 & 168 memory sell for 80% of IBM's memory.
- Plug-compatible 2401- and 3420-type tapes sell for 40% to 80% of their IBM counterparts.

And, most significant, a plug-compatible CPU that has been marketed for several years to IBM 1130 and 1800 users has a market value several times that of its IBM counterpart. This difference is a result of the use of current (not outdated) technology in the plug-compatible system.

Like Itel's AS/4 and AS/5, it utilizes IBM system control programs, program products, users programs and current systems programs.

To summarize, later in the life of a product it is apparent the user is generally willing to pay *more* for the machine which offers equal or superior function along with more current technology . . . thus the strong showing of plug compatibles today.

### Best Financial Decision?

Itel has traditionally offered either purchase or full payout leases on its products. We are marketing the AS in the same manner.

This does not mean, however, that the user must give up his flexibility. Itel's AS can be upgraded in the field to a larger model; and Itel regularly subleases, or takes in trade, equipment which a user no longer feels can do his job and replaces it with more appropriate equipment.

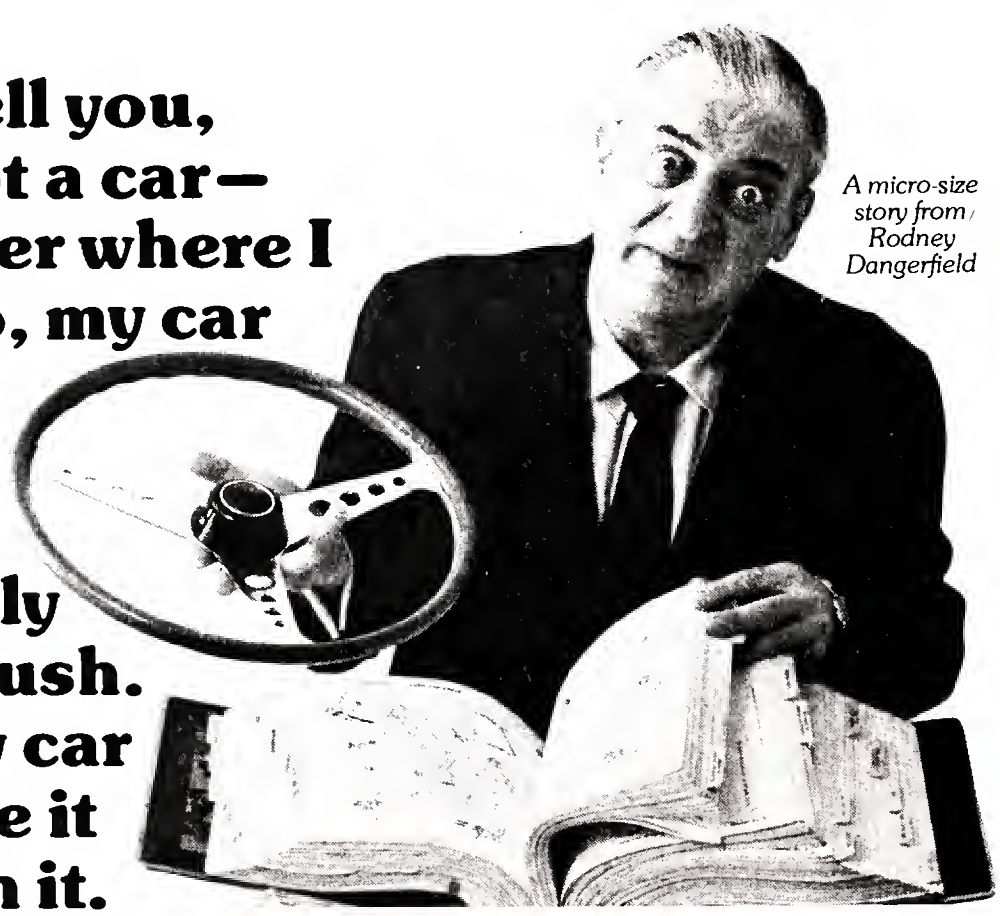
In addition, Itel has been the pioneer in supplying software and peripheral enhancements to extend the life of a system (i.e., 3330-type disks on 360/40 through 360/65 systems, DOS/VS support for 370 users who wish to "reverse migrate" to a 360 and get better price/performance). We will continue our creative thinking.

Let us now take a look at the true savings when comparing Itel with IBM. We will look at both lease and purchase on a basis of seven years, a realistic term for the large systems user.

Lease or purchase over a shorter term would, in our opinion, produce significant savings (an Itel four-year conditional sale provides savings of $4,000 to $5,000 per month over IBM's four-year lease plan plus gives ownership to the customer at end of the lease term), but for the purpose of brevity we will concentrate here

(Continued on Page 22)

**I tell you, I got a car— no matter where I want to go, my car don't want to go there. Every Sunday I take my family out for a push. I got the only car dogs chase it and catch it.**



*A micro-size story from Rodney Dangerfield*

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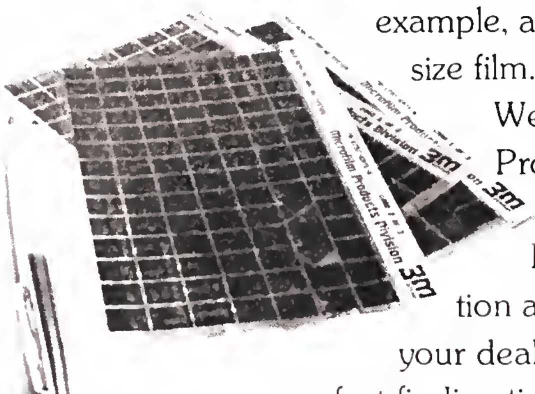

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# Figures Show Users Come Out Better With Itel CPU

(Continued from Page 20)

only on one term.

The equipment used for comparison will be an IBM 370/158 Model 3 with 2M bytes of memory, five block multiplexer channels and one byte multiplexer channel and an Itel AS/5 Model 3 identically configured.

The purchase price of the 370/158 is $2,328,905 plus tax; the AS/5 sells for 65% of the IBM purchase price plus tax.

We assume a 10% debt cost for the user who is in a 50% tax bracket.

In the purchase comparison, we have used an anticipated residual value of the 370/158 at 13% in 1984 based upon the estimate of a company which is well-respected in the computer industry, International Data Corp. Based upon the strength of plug compatibles mentioned before, we could easily project the AS to have a residual value equal to or greater than that of the 370/158, but for purposes of this conservative analysis we will use a worse-case number of one-half that of IBM's future anticipated 1984 residual value.

Further purchase assumptions include:

- Depreciation:
  1. Double declining balance, years 1-4.
  2. Straight line, years 5-7.
- An investment tax credit of 10%.
- No personal property tax (since some states don't have it).
- No insurance added (although it would favor Itel).

When it comes to leasing, the IBM machine costs $2,737,224 ($1,131,329 after tax) after the user makes 84 monthly payments of $32,586. The Itel system costs $1,878,912 ($776,577 after tax) at $22,368/mo.

When it comes to buying, the IBM machine costs $2,468,639 ($992,755 after tax); the Itel system costs $1,604,615 ($661,421 after tax).

Calculations show there are tremendous savings to be realized with the Itel AS. Gross lease payments for the AS/5 are more than $850,000 (or more than $354,000 after tax) less than the IBM 370/158 alternative. And the AS/5 is more than $864,000 less costly for purchase, or more than $331,000 less on an after-tax basis.

In conclusion, Itel's AS is a solid product being manufactured by a well-respected semiconductor company. Furthermore, it is marketed by an innovative, energetic company whose dedication to the industry has been proven through tangible programs and products which benefit the user and provide a financial alternative to IBM.

Itel is the financial alternative to IBM.

*Hunt is vice-president of marketing at Itel Corp.*

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# Open Letter to Next President

(Continued from Page 19)

Then, I said "The current management must mend its ways. Center management must: immediately stop taking on new commitments without adequate planning and without finishing up the old ones; stop bringing in new hardware without appropriate staffing and support resources; start looking at more efficient ways of handling software development; and start providing the time, the environment and the feedback necessary for the technical people to do a job of which they can be proud.

"Execution-level central staff members must: commit to short- and long-range plans of the centers and stop changing development plans each week; establish annual budgets for centers and stop interfering with center projects; and focus on the appropriate staff functions of standards and performance evaluation and not operating details."

In conclusion, I sincerely hope the new leadership you bring to the government possesses the experience and knowledge necessary to apply this magnificent computing technology to government problems in an intelligent and practical manner.

*Letters outlining questions, issues or situations pertinent to human relations in the DP setting may be addressed to Stone c/o Computer Education International, Inc., Suite 222, 2233 Wisconsin Ave. N.W., Washington, D.C. 20007.*

Toward this goal and on behalf of the industry, we pledge to you our wholehearted and enthusiastic support.

Sincerely,
Jack Stone

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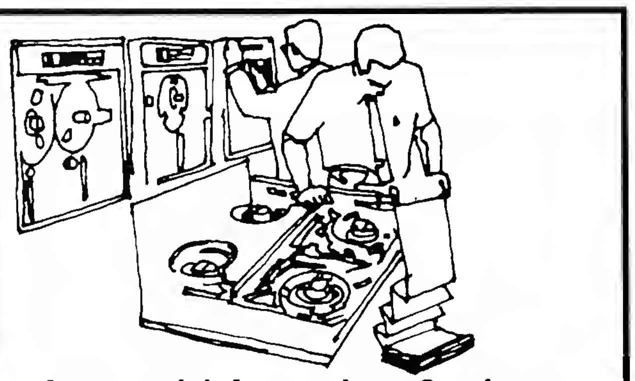

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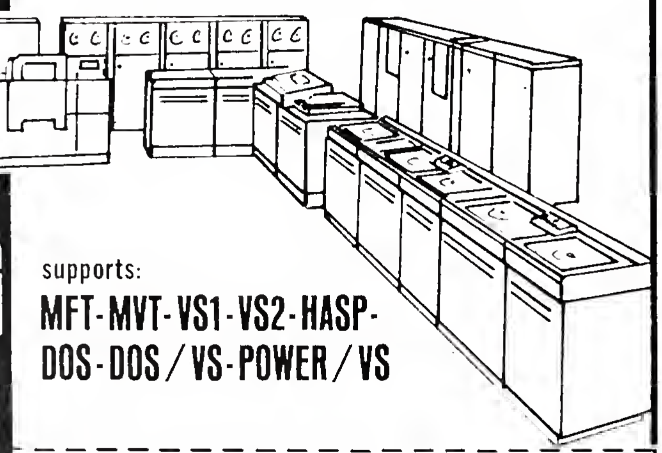

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# Michelson Award Goes to Fedsim Star

ATLANTA – Philip J. Kiviat was presented with the 1976 A.A. Michelson Award for the advancement of computer systems measurement at the recent annual conference of the Computer Measurement Group (CMG) here.

Although given by CMG, the award caps an extensive screening process, including consultations with leaders of most of the major computer performance evaluation (CPE) groups, before the winner is selected, according to DMG Director David Schumacher, who made the presentation.

Previous Michelson award winners have been Kenneth Kolence and Thomas E. Bell.

Obviously pleased with the award, the puckish-looking Kiviat, technical director at the Federal CPE and Simulation Center (Fedsim), said he is also pleased with the growing acceptance of the need for performance management in many DP centers.

Among the contributions made by Kiviat and listed in the citation that accompanied the award was the Kiviat graph, described as "a simple method for presenting multiple performance measures, each with no predetermined ideal, in such a way that the measures have an easily recognized meaning."

The citation also saluted the winner's "setting and meeting high standards of professionalism for the application and reporting of [CPE] within the U.S. government" through his post at Fedsim and the enthusiasm with which he pursues his duties there.

Kiviat's chairmanship of the Association for Computing Machinery's Special Interest Group on Computer Metrics (Sigmetrics) was noted in the citation, along with his "chairing dozens of conference sessions, serving as program chairman and serving as general chairman for [CPE] conferences through the international level."

His design and development of Gasp – "an easy-to-use simulation language" – and the "more comprehensive" language, Simscript, were also listed on the citation as among Kiviat's "singular contributions" to the field of computer performance measurement, evaluation and management.

### *Vendor Funding Encouraged*

# CPE Evolving Into Performance Management: Kiviat

**By Don Leavitt**
Of the CW Staff

ATLANTA – Three separate developments have combined to force DP managers to become interested in computer performance evaluation (CPE), but the classic interests of CPE – limited to the internals of the equipment – aren't good enough anymore, according to Philip J. Kiviat.

The increased number of on-line systems has made the efficiency of the DP center highly visible to many people. System failures in that environment can't be hidden as they might have been in batch mode operations, he reminded the Computer Measurement Group (CMG) as he accepted the A.A. Michelson award recently.

The technical director of the Federal CPE and Simulation Center (Fedsim) also pointed to the growing complexity of operating systems and the real acceptance of proprietary software packages – "where you don't really know what's going on inside" – as factors behind the upsurge in attendance at meetings such as CMG and – just a week earlier – the CPE Users Group (CPEUG).

### Change of Label

While the hope for cost savings through CPE efforts still exists, Kiviat said, the concern now is for performance and for the control of changes that seem almost beyond control.

These are, or should be, the classic concern of managers, he added, and therefore the phrase "computer performance management" (CPM) probably should replace the more limited CPE.

This change in concern has helped CPE technicians gain a degree of professional status because, "all of a sudden, DP managers – or their bosses – see they need us to help if they are to achieve their own ambitions."

The use of CPM as a label for what is needed should remind all involved in DP that the "new" task of CPE is to deliver service to whoever needs it "from the total installation."

It is no longer acceptable to "optimize" the hardware if the support functions aren't as effective as they might be, Kiviat indicated.

This might mean a greater interest in the role of people within the DP center, he said, but it also means – in highly distributed processing systems – that CPE technicians have to see their efforts limited by completely new problems, data communication equipment delays on the one hand and user interfaces – "think time, for example" – on the other.

### Savings Now Secondary

In the large systems that are being put together, the dollar-saving goal is secondary, Kiviat said. An interest in the capacity of the system and support for the need to predict when it may become saturated has become dominant, he pointed out.

"We're obviously willing to share our experiences with one another, otherwise we wouldn't be here," he noted, "but we have to make much greater commitments and encourage vendor participation in a broad-ranging program of investigation" if DP organizations are to remain in control of their responsibilities.

"Real constructive work on applications and solid investigation into the theories behind computer operations is urgently needed," he went on. "Current projects in this direction have been poverty-stricken.

"I see a need for corporate investments in such investigations," and DP vendors "should certainly be encouraged" to provide funds to independent organizations such as user groups to encourage such work, Kiviat said.

"It's unimportant which group they support; we tend to work together anyway," he said, noting he wasn't necessarily making a "sales pitch" for funds for CMG.

Afterwards, he said he felt funding in the form of grants by vendors would not jeopardize the not-for-profit tax status that various user groups hold.

For their part, the practitioners and theoreticians were urged by Kiviat to develop a comprehensive discipline so the current separation between measurement of "real" systems and simulation of proposed ones would no longer exist.

Even the measurement of current systems is fading in its importance, he said, explaining hardware vendors are quite generally providing raw measurement data.

### User Paradox

Modeling is going to grow in importance, Kiviat said, although users face a paradox: details of how the operating systems and the proprietary packages really work are today more hidden from view – and more vital if the models are to be any good at all.

The development of CPM – rather than just CPE – means the technicians will be spending more time on design and planning of systems and less on after-the-fact tuning, he added.

# CPE Proceedings Now Available

Both the Computer Performance Evaluation Users Group (CPEUG) and the Computer Measurement Group (CMG), which held annual meetings a week and a continent apart this month, have copies of their proceedings available for distribution.

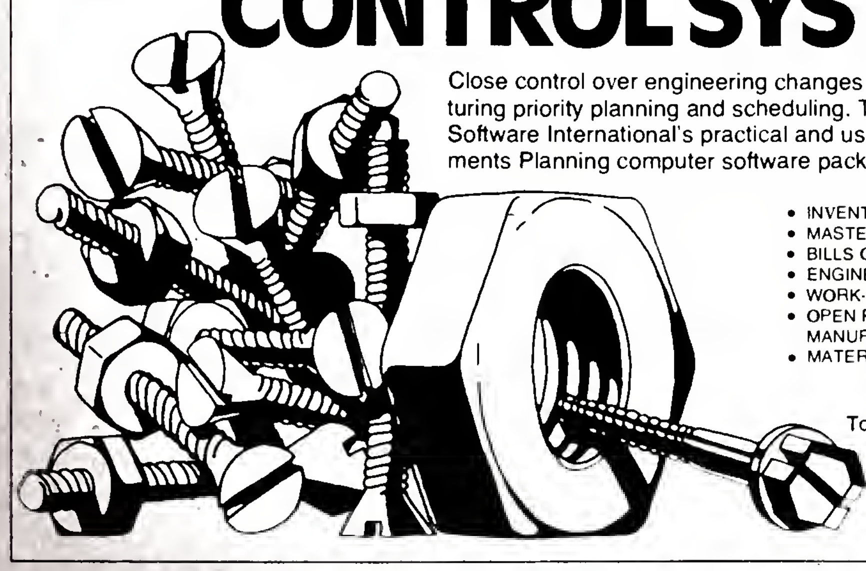
Each is bound in soft covers and is about 230 pages long.

Papers from the 12th meeting of CPEUG cost $10 – checks should be made payable to CPEUG – from the National Bureau of Standards, A265/Technology Building, Washington, D.C. 20234.

The CMG proceedings are available for $35/copy from Ian K. Roome, CMG treasurer, at McAuto-West, 3855 Lakewood Blvd., Long Beach, Calif. 90846.

Some copies of proceedings from past CMG meetings are also available for the same price, Roome noted.

Although some papers did not reach the CMG proceedings editor in time to be included in this year's proceedings, they will be published in the group's quarterly publication as they are received, he said.



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# Data General's AOS Controls Eclipses Heuristically

SOUTHBORO, Mass. – The Advanced Operating System (AOS) introduced by Data General Corp. (DG) for some members of its Eclipse family enables C/330 and S/230 users to control multiple, concurrent timesharing, batch and real-time operations, the company said.

AOS is said to schedule operations by monitoring all activities and adapting the system to user priorities and the past behavior of the tasks being performed.

This "heuristic" approach makes efficient use of memory, CPU time, mass storage and peripheral units, a spokesman explained.

The system also provides a number of user-accessible capabilities. A Command Line Interpreter (CLI), for example, makes system functions available to terminals users and handles interactive and batch jobs without a separate job control language.

The CLI macro facility combines a complex series of instructions into a single command.

A "smart" spooler gives multiple users access to a single output device and is said to give each one orderly service. Queue control allows operators to alter priorities.

A dynamic visual display of system activities allows operators to check the current status of each user's process.

Hardware error logging and on-line reporting with soft error retry and recovery aids system maintenance.

The number of concurrent time-sharing users varies with the complexity of their work and the languages being used. In a demonstration, however, DG ran 12 interactive terminals, a simulated building security process control operation and two simple batch jobs

AOS is described as "process" oriented – a process being "a group of program tasks that share up to 64K bytes of memory address space and compete for system resources as a unit," DG said.

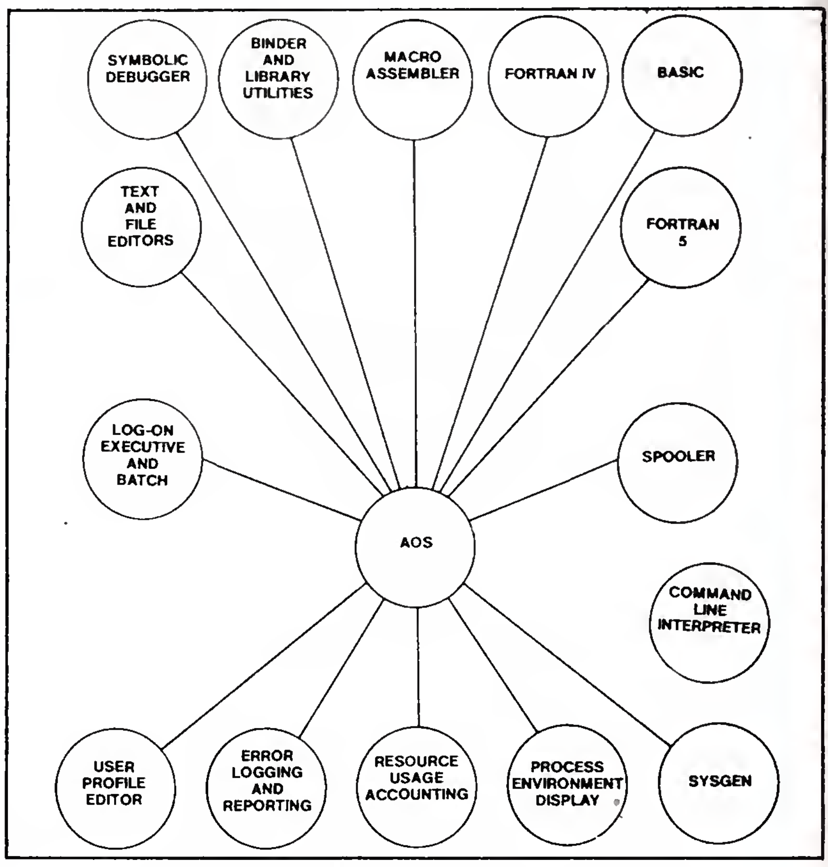
Each process is allocated a set of resources and privileges which define how much CPU time and memory the process can use.

All processes in the system are organized into a "family tree" and a parent process can, based on its own privileges, create offspring processes and define their privileges.

If AOS observes a swappable process is compute-bound, it will increase that process' share of CPU time when it next becomes eligible to run, but lower its priority to allow interactive jobs to run first.

AOS resource management capabilities include dynamic memory management, with sharing of common code and data to reduce memory requirements, and support for program overlays.

It also offers data management with hierarchical directories for file security, dynamic allocation of disk space and hierarchical structures for fast file access, DG said.



Components of the Advanced Operating System

Synchronous and asynchronous communications can be integrated into the operating system, and support for the DCU/50 communications processor reduces CPU overhead, the spokesman added.

AOS also provides support for the multiprocessor communications adapter to link Eclipses.

"Typical" S/230 and C/330 systems that might use AOS have 256K bytes of memory, at least one 100M-byte disk, a 9-track magnetic tape drive, communications multiplexer, a mix of eight- to 12 terminals and/or a printer.

A license fee or $2,500 includes all system features with the exception of Fortran IV, Basic and Fortran 5. The addition of these three languages would bring the user's cost to about $5,000.

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# Tandem Adds Data Base, Communications Software

CUPERTINO, Calif. – Tandem Computers, Inc. has added a data base record manager, a CRT screen formatter, a data communications manager and a series of utilities to the software intended for its Tandem 16 Nonstop computer system.

The data base software, Enscribe, supports a method of defining, accessing and updating common records and is said to be capable of providing service to "hundreds of terminal users."

Stressing the security aspect of the system, Tandem claimed Enscribe ensures that indexes within a data base are not corrupted by any failure.

The software also provides an optional "mirroring" capability with which duplicate disk-based files are created simultaneously, if a failure eliminates access to one, the other will be available, Tandem said.

Enscribe supports a record-locking facility so records being updated by one user cannot be accessed by any others until the first operation has been completed.

Enscribe sells for $6,000 and will be available in February.

The CRT screen formatter, Entry, allows users to design screens interactively on page mode display terminals. Individual fields within each screen may be named so editing rules and access to the data is simplified, according to a spokesman.

This validation and retrieval tool costs $2,000, he added.

Envoy, the data communications package, supports both asynchronous and synchronous operations with single or multidrop lines on either a local or remote basis, Tandem said.

Data transfers from terminals to main memory occur on a direct memory access basis. Processor interruptions are therefore not required to handle incoming data, the spokesman continued.

In binary synchronous operations, terminal polling and character translation between Ascii and other codes is hardware-executed, leaving the processor free to handle applications work.

Both Envoy and the utility software, called Ensure, are considered part of the basic system and are free, Tandem said from 20605 Valley Green Drive, Cupertino, Calif. 95014.

# D.C.: A 'Nice' Place in the Spring

BETHESDA, Md. – A National Information Conference and Exposition (Nice), sponsored by the Information Industry Association (IIA) and scheduled for next April in Washington, D.C., will focus on "The Emerging Information Manager: Bridging the Information Gap," according to the association.

More information about the conference, which will run April 18-21 at the Shoreham Americana hotel, is available from IIA at 4720 Montgomery Lane, Bethesda, Md. 20014.

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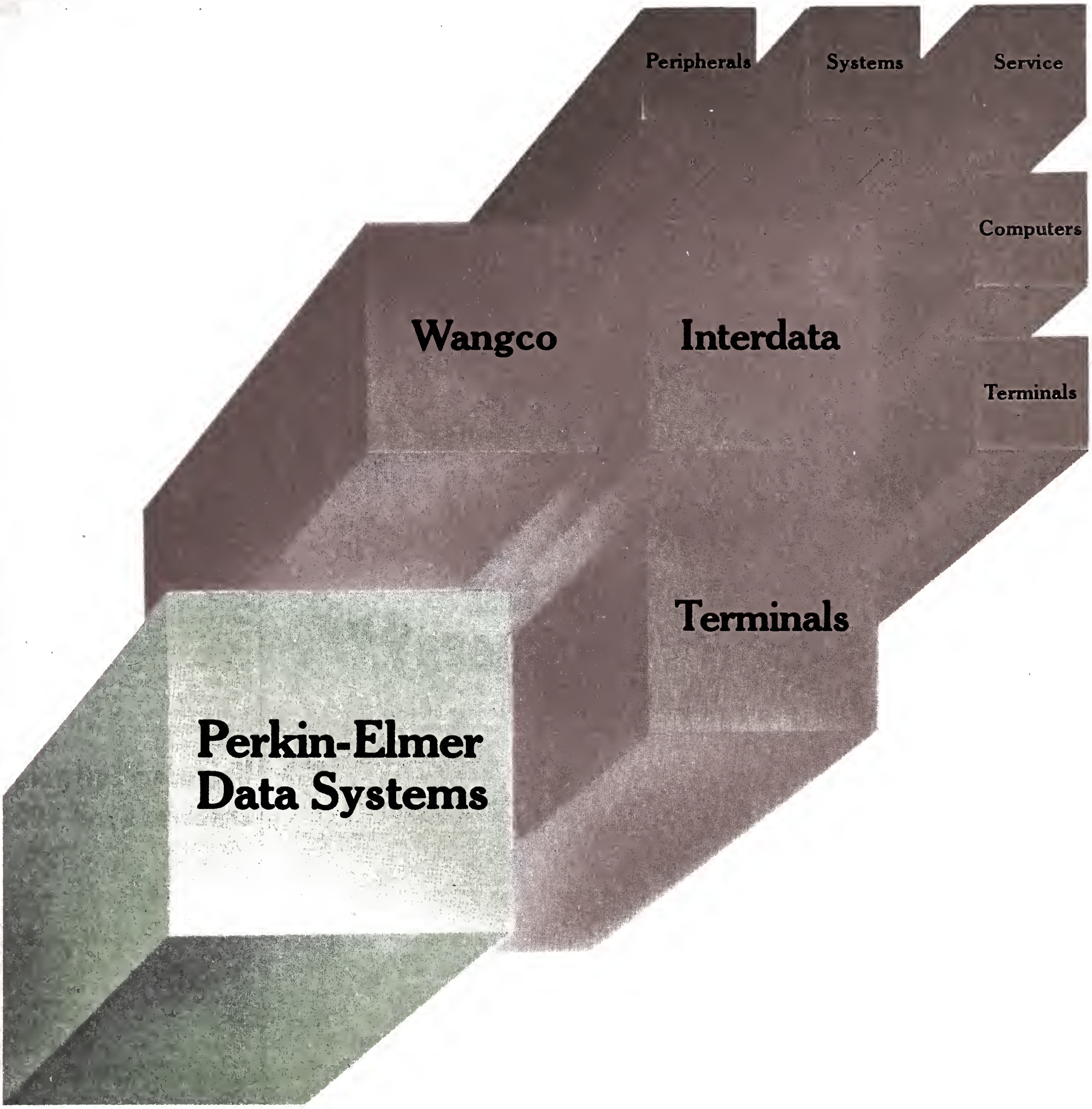

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# 'Kiviat Blob' Adds New Dimensions to System Tuning

Special to Computerworld

SUNNYVALE, Calif. – Robert C. Coolidge, vice-president of marketing for Boole & Babbage, Inc., has just announced the formation of a Hybrid Tools Division. This division will develop measurement products that combine software and hardware techniques to plunge into new frontiers of system monitoring and optimization.

The first product scheduled for release from the fledgling department is a totally new approach to measurement called the "Kiviat Blob." The Blob is a multidimensional extension of the time-honored concept of the Kiviat graph.

Of course, the graphs are merely two-dimensional and present a single static picture of system performance. In contrast, the Blob is four-dimensional!

The product includes one or more laser-driven holographic projectors which create a 3-D image of system status in mid-air, right before the gleaming eyes of the performance engineer! The fourth dimension is time: The projector is directly coupled to an on-line monitor so the projected image varies in real time to provide an instantaneous dynamic image of system behavior.

The images glow brightly in a full spectrum of colors. Each address space or initiator in the system has a different color and glows, flashes and changes shape to display the current activity. When your system is "in the pink" you will actually see it (no need for rose-colored glasses).

If the system crashes, the Blob warns you by shrinking to an ominously glowing red sphere.

Imaginative users will find many fascinating ways to use the Kiviat Blob. Each projected Blob may be set independently for any diameter from one inch to 500 feet and may be focused at any desired location.

Thus, one user may generate a small Blob to hover near his desk, while another may focus a Blob two feet in diameter up high in the computer room so everyone may observe system performance.

*The DP community often takes itself very seriously, but whimsey breaks through on occasion.*

*According to the person who sent us the accompanying article, it was written by an unknown technician at Boole & Babbage, Inc. and posted on that company's bulletin board as a relief from the strains of the day.*

This can give added incentive (or pressure) to the computer operators to keep the system in the pink.

One beta-test user focused an image 250 feet in diameter in the sky near his office so he could go home at night and still monitor the system by looking at the Blob from his living room window.

(Caution: FAA regulations prohibit the projection of Blobs more than 1,000 feet above ground because they confuse pilots. Furthermore, hippie groups tend to congregate near such Blobs and watch them during LSD trips.)

The Blob projectors can be set to store the same images they are projecting, so selected time periods may be reviewed later and may be replayed either faster or slower than real time.

The Blob provides up-to-the-microsecond information about the monitored system, but the amazing thing is that it requires no main storage, no CPU time and none of the devices of the system being measured!

The monitor program resides in a separate computer, and every microsecond it updates its status information by examining the monitored system through a channel-to-channel adapter. The monitor itself executes in a dedicated 370/168 with a minimum of 4M bytes of real storage.

Beta-test users have already found the installation of the Kiviat Blob monitor has allowed them to increase throughput by 20% to 40% on the measured system. If you can use that kind of improvement, call the Hybrid Product Manager today!

In closing, our source whispered that plans under development now will add another dimension (the fifth dimension) to the Blob: sound! With the addition of computer-generated music and sound effects, new meaning will be added to the concept of system tuning.

No release date is available as yet since Boole & Babbage is still in the midst of difficult negotiations with the Sunnyvale Philharmonic.

# Upgraded Software Enhances Sycor 400

ANN ARBOR, Mich. – Software now available from Sycor, Inc. for its 400 series of distributed data entry and processing systems provides additional utilities and permits dynamic system configurability, the company said.

The ability to dynamically reconfigure the system allows a user to structure memory and resident software to permit the 440 or 410 to act as a clustered intelligent data entry device, a remote job entry terminal, a satellite printing station, a Cobol processor or a system with concurrent foreground/background processing, a spokesman added.

A dump/restore capability provides a means to create a backup copy of any part of the system's fixed disk. Run as a stand-alone program, the dump/restore utility creates a cassette, magnetic tape or flexible disk which may then be used to reload and restore the files, he said.

A construct utility is also provided to reinitialize a 400 system and restore system files from a "cold start," he continued. The program is contained on the unit's flexible disk or cassette, depending on the user's configuration, and verifies the reconstructed disk against the contents of the flexible disk or cassette.

The software release supports the ability to use both the company's typewriter- and keypunch-style keyboard terminals in the same cluster. It also supports magnetic tape, card readers and flexible disk interchange with the Sycor 350 intelligent terminal.

Using the software system, a Sycor 400 system can act as a master station unit for transmitting data to and receiving files from unattended remote Model 340s, 350s or other 400 series systems using point-to-point IBM 2770-compatible binary synchronous communications over switched or private lines, Sycor said.

The software is free, Sycor said from 100 Phoenix Drive, Ann Arbor, Mich. 48104.

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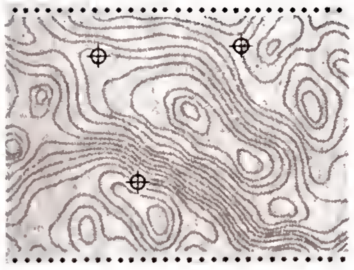

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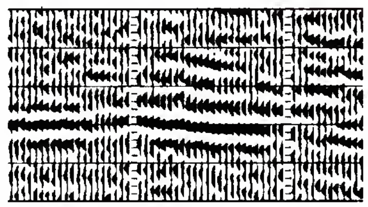

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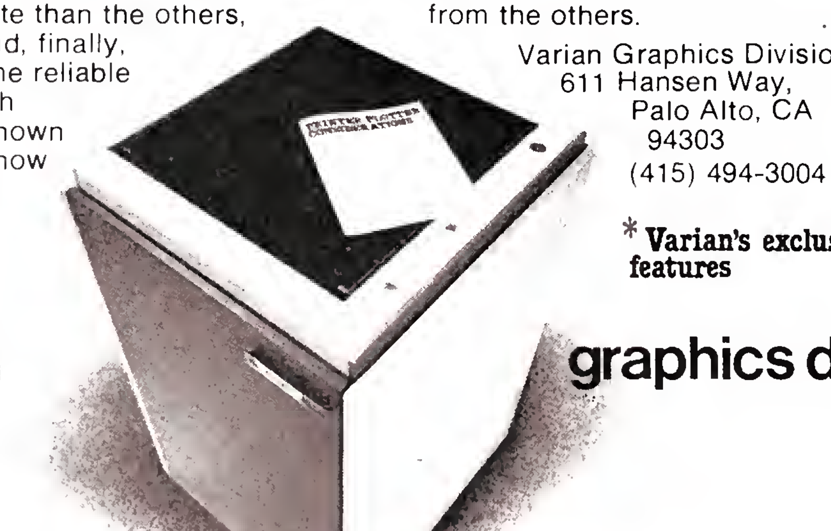

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## Good Management Helps, Too

# DBMS Enhances Insurer's Ability to Aid Customers

By Orin Huffman

Special to Computerworld

LANSING, Mich. – How did Auto Owners Insurance Co., which originally provided only automobile insurance to one state 60 years ago, grow to a full-facility insurance underwriter with annual sales of over $195 million in 16 states?

Good management, mostly. A management that since the early DP days has been extremely innovative and aggressive in automating the routine, repetitive internal operations, such as accounting and rating policies, in addition to providing rapid response to customers.

It was a slow, consistent process. Step by step, we developed new projects and constant studies. This also allowed us to hold our number of employees quite low, which has a very favorable bearing on the overall expense ratio.

We started our first computer-based automobile policy-processing system in 1958, and we've been rating private and commercial policies since 1964. Our main accounting system is also quite advanced.

We currently operate with an IBM 370/158 and have three automobile data base files totaling over 1.8 million records managed by Adabas, the data base management system (DBMS) from Software AG, and utilize three IBM 3330-11 disk drives.

There are 35 data entry stations from General Computer Systems, and inquiry is via 24 CRTs supplied by Courier. Approximately 30,000 to 40,000 documents are printed daily on three IBM 1403 N1s.

This original commitment to the data base concept has paid off. Good service is our major marketing tool.

In our 16-state region, we deal with over 2,000 insurance agents. They choose our coverage because they know from experience that they will have the client's policy promptly, that claims will be processed as expediently as possible and that we will provide special services when requested. Auto Owners prides itself on the speed with which claims are settled.

The turnaround time on issuing policies is directly related to our automobile data base files. When a branch office receives a request for coverage from an agent, it determines whether it will accept the risk.

If the risk is accepted, the information is keyed onto IBM 3741 or 3742 diskettes and dispatched daily to the main office here, where the diskettes are transcribed to magnetic tape for batch entry.

Batch processing is handled daily in two shifts. An average of 600,000 auto policies are read every day. This includes original coverages, endorsements, renewals, cancellations, billings, etc.

### Direct Collections

The direct collections system is a fairly recent option available to certain agents. In this case, the customer is billed directly by Auto Owners and may choose to pay either in full or in three equal payments.

There is a small fee to the agent for utilizing our direct payment system. This is quite attractive to a large agent because it cuts down drastically on his own office staff, bookkeeping problems and expenses.

In many cases, the payments come in without the bill or policy number. As a result, although this department has the smallest data base, it has the largest inquiry rate.

Nine people using five CRTs make an average of 1,500 on-line inquiries a day. Adabas' phonetic capability has been extremely useful here.

Where we have no policy number, we can easily find the insured phonetically and verify his policy number and payment amount.

Adabas has probably had the largest impact on personnel in this department. Without it, we would need 20 employees instead of nine to handle the workload. And at the rate this system is growing, this will continue to be quite important to us.

We had moved from an IBM 370/155 to a 370/158 and solved a lot of scheduling problems based on real memory constraints. When we went to the 158, we had already made the commitment of ultimately utilizing interactive programs, the data base concept and a telecommunications network for data entry and inquiry.

Because of our vast number of records, our automobile data base was becoming unmanageable and was consuming too much storage space. A study committee recommended that we investigate other options for data base management. A number of suppliers were contacted and visited.

After a paid demonstration in September 1975, we made the commitment to convert to Adabas last January. We also made the commitment to utilize IBM's Customer Information Control System (CICS) as our communications link.

The next three months were spent in learning how to best use CICS and Adabas and in implementing our conversion. In May, our first data base was in production. The conversion went quite smoothly and the simplicity of using the new system was a great asset.

Our next system, the loss data base file with 200,000 records is slated to be operative around the end of next February. By the second quarter of '77, we will have our entire fire and homeowners business on-line.

We are currently building this data base, which will have 11 files totaling over one million records. We'll be adding four IBM 3350 disks for storage (with room to spare) and 11 CRTs for inquiry capability.

Both systems will have the same format and applications as our automobile system. With these three data bases operating, we will be in a position to cost justify a telecommunications network from our remote branches, which we would like to implement over the next two to three years.

*Huffman is assistant vice-president/data processing at Auto Owners Insurance Co. in Lansing, Mich.*

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# On-Line DBMS Coordinates System Reliability Files

By Robert Dobbin and Dennis Stange

Special to Computerworld

SANFORD, Fla. – One of the major tasks of the Stromberg-Carlson (S-C) Reliability and Maintainability (R&M) Engineering Group is the assembly and analysis of data related to the performance of the company's newly announced "System Century" telephone systems.

The data required ranges from detailed information on electronic components to the configuration of complete systems. Telephone switching systems are complex, using thousands of electronic parts, and system configuration depends on the telephone line capacity and service features required by a specific customer.

Fortunately, although there are many types of printed wiring board (PWB) assemblies used in any system, a particular type of PWB may be used from two to several hundred times, and standard electronic parts are used on the circuit boards. Thus, an opportunity existed to build a data base that would require minimum effort to update and keep current, providing there was a means to use the data in one file to operate on or collate data from any or all of the other input files.

S-C selected the Nomad data base management system (DBMS) on National CSS's timesharing network as the system for managing this flow of data.

With Nomad the R&M group can obtain rapid-turnaround of data and remain current with any design or configuration changes in the System Century. Nomad also has the flexibility in output while using relatively simple, easily maintained input files.

Prior to the DBMS, useful information was obtainable only by laborious manual exercise and was therefore updated irregularly and usually on an urgent basis. This does not, of course, help in advance planning or early identification of potential problems.

NCSS provided training for S-C personnel and has helped develop the data base and procedures. The person selected to work with Nomad had a general knowledge of the S-C systems and limited computer experience. The overall results, have proved to be extremely satisfactory.

One of the missions of R&M engineering is to measure the reliability performance of the product and ensure that it meets the product goals. To assist in this task, three basic data files have been created:

- Electronic Component File. This file contains information for each component type and value, and the data includes S-C part number; generic type; values, tolerances, etc.; and failure rate information.
- Printed Wiring Board Files. PWB files identify the part number, quantity and stress of each electronic component used on the PWB.
- System File. This file contains the listing of PWBs and the quantities used in any configured system.

Changes and modifications can be made to the basic input files and the impact to the total system can be rapidly determined. From these basic input files other output files can be constructed and analysis of various system configurations can be made.

Present results indicate Nomad could provide an excellent tool for advance planning for electronic systems development and production.

*Dobbin and Stange are reliability engineers within Stromberg-Carlson's Reliability and Maintainability Engineering Group.*

# Programmers Finding How to Use PERFORM

By Stephen E. Wright

Special to Computerworld

The implementation and use of the PERFORM verb in Cobol is an interesting case study in the harmful reinforcement of attitudes by software designers and users.

**Concepts and Techniques**

When Cobol was first proposed, it was obvious to everyone that a closed subroutine facility was needed. The PERFORM verb was specified for this facility. It has been implemented ever since by linkage mechanisms more or less costly in terms of execution time and space.

Users aware of these costs studiously avoided the use of PERFORM except to execute a procedure from more than one point in the program.

The advent of structured programming led to a quite different application of PERFORM. It became the mechanism for invoking modules within the hierarchical structure of program control.

This led to using PERFORM in ways that 10 or 15 years ago would have sent experienced programmers into hysterical fits. We now see programs with a module PERFORMing another module which contains little more than another PERFORM, and so on down the line.

And for very good reasons – it is these "unnecessary" PERFORMs that allow the decomposition of large programs into manageable pieces.

This technique of hierarchical control is meeting with some resistance because of the costs in time and space. It is important to note, however, that these costs are a historical artifact.

There is no reason why implementors cannot provide completely cost-free implementation of such PERFORM statements by placing the invoked code *in-line* in the object program. An indirect advantage is improved performance in a VS environment.

The disciplined use of hierarchical control and the availability of efficient implementations should reinforce each other in the future.

*Wright is a senior staff consultant at Applied Data Research, Inc. in Princeton, N.J.*

# CDMS Price to Stay Down If Users Tell Intent to Buy

WELLESLEY, Mass. – Although Cullinane Corp. has announced a price increase for the Cullinane Data Management System (CDMS) as of Jan. 1, users may acquire the system or any of its components at current prices until March 31 if they submit a letter of intent by the end of the year, a Cullinane spokesman said.

Cullinane is at 20 William St., Wellesley, Mass. 02181.

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### FCC Told in Briefing

# Small Users Suffering From Big Network Access Costs

**By Edith Holmes**
Of the CW Staff

WASHINGTON, D.C. – Despite improvements in data transmission facilities since the 1960s, high access costs to digital nodes still plague commercial users whose operations are small and located outside main metropolitan areas, the Federal Communications Commission (FCC) was told recently.

Another area of user concern is "the very high cost of international links," Alex Curran, president of BNR, Inc., told the commission at a technical briefing provided by the American Federation of Information Processing Societies here.

"Research and innovation is needed at these two network limits," Curran said. If the cost of network access for smaller users and the cost of intercontinental transmission can be reduced, common carrier networks will be able to cope with commercial users' traffic, he added.

"Today there are adequate offerings to cater to the needs of users in large metropolitan areas, but that isn't enough. It is already clear some office and home services will depend upon the ability to reintegrate voice and data capabilities," Curran stated.

In addition, some services proposed for widespread implementation "will require that switching machines recognize information specifications as valid addresses," he said.

The boundary between communicating and computing will become more blurred, Curran predicted, highlighting one key problem the FCC faces in carrying out its regulatory responsibilities.

But "there are economic arguments for suggesting that the boundary definitions be relaxed to encourage a new cycle of innovation," he suggested.

If effective solutions to the switching, distribution and terminal needs of the homeowner can be developed, then "embryonic" services like electronic mail, electronic news services and subscriber response measurement systems might begin to grow, Curran told the commissioners.

"Users of remote access data processing systems are notoriously critical of the services offered – and the performance levels acheived – by the telecommunications common carriers," he said in his description of the industry to the FCC.

The organization of teleprocessing services might have something to do with user expectations, Curran suggested. The user wants access to specific information; if the information is remote, then telecommunications is necessary – but it shouldn't restrict the speed or accuracy of access, he said.

"The ideal telecommunications link is totally transparent to the information flow," he continued. "That makes the market a very difficult one to serve."

Curran predicted this view of the telecommunications link as "at best a necessary evil" will change as communications networks become more active in providing DP services.

"DP is still an activity reserved essentially for institutions," he told his audience. Computer hobbyists and the National Aeronautics and Space Administration and Department of Defense networks represent extremes not representative of the predominantly commercial market, he added.

Statistics for the U.S., Canada, Europe and Japan indicate remote DP is still a small industry, where "small" is qualified in relation to the total telecommunications or information processing markets. Figures for data communications for these countries cluster around 1% to 2% of the total telecommunications traffic, for example, Curran stated.

He also noted that high growth rates, in the neighborhood of 20% to 25% annually in some cases, lead to projections of large and rapid investments in this area.

### T/S Responses Different

Aimed principally at medium-sized businesses, time-sharing requires a different response, Curran went on. These businesses are generally too small to own self-sufficient computing facilities, but large enough to employ a technically competent staff.

Access to a network is required in many smaller centers and, within those centers, at locations outside the main business district, Curran said.

*(Continued on Page 31)*

## Four Stages of Development

WASHINGTON, D.C. – Officials of the Federal Communications Commission (FCC) were briefed here recent'y on the history of data communications services by Alex Curran, president of BNR, Inc.

Curran traced the evolution of communications services for institutionally based users by identifying four developmental stages at a technical briefing provided by the American Federation of Information Processing Societies.

Nonreal-time data transfer gave the first growth impulse to the industry in the 1950s, Curran said. Time-sharing followed when it became feasible in the 1960s.

Message service became a computer-based possibility in the late 1960s. And finally, transaction systems are today of increasing importance, he said.

Each of these stages has imposed different user requirements on telecommunications networks for transfer rates, response times, tariff structures and geographic extent, Curran noted.

Very large corporations' inventory and shipping control systems are typical users of nonreal-time systems, he told the FCC. Their data is truly bulk data, accumulated over the business day at a distributional office and then transferred all at once to the regional or head office.

Transmission times are in the range of 10 minutes to 30 minutes at transfer rates of 2.4- to 56 kbit/sec, Curran said, adding such service is attractive to large firms located chiefly in the business districts of large metropolitan areas.

The telecommunications response at this stage involves high-speed point-to-point channels; a network accessing large metropolitan centers; reliable, low error rate transmission paths; and no complex switching problems, Curran said.

# DG Terminals Offer Physical Flexibility

SOUTHBORO, Mass. – Data General Corp. (DG) has introduced two 1,920-character CRT terminals with detached keyboards and a pedestal base which it said enable operators to swivel the screen both horizontally and vertically for easy viewing.

The top-of-the-line version, the Model 6053, offers direct cursor addressing and sensing, allowing high-speed cursor positioning and control with minimum processor overhead, DG said.

Its full-function keyboard contains an 11-key numeric pad, separate keys for editing and cursor positioning, 11 user-defined function keys for high transaction throughput and an upper/lower case Ascii character set.

Optional fonts are available for France, Germany, Sweden and the UK, the company said.

The terminals offer character highlighting features including character blink, character underscore and programmable dual intensity.

The display is organized in a 24-line by 80-character format over a 6-in. by 9-in. viewing area. Characters are defined by 5 by 8 dot matrices.

The terminal interface operates asynchronously at speeds up to 19.2 kbit/sec, DG said, and hard-copy output is available with a receive-only 60 char./sec Dasher printer option.

The Model 6052 "basic" unit does not include underscore and dual-intensity features. Its teletypewriter-style keyboard contains a 64-character upper case Ascii set and eight function keys.

The monitor is said to be the industry's first to swivel on two axes, and a bonded faceplate over the display is aimed at reducing reflections and glare from overhead lighting.

All adjustments are on the outside of the display case except for volume control of the audible end-of-line indicator, DG noted. The detached keyboard may be placed as far as four feet from the monitor.

Both terminals will be offered with DG's Nova and Eclipse minicomputer systems, according to a company spokesman. The Model 6053 was designed for utilization in implementing Eclipse C-330-based Interactive Data Entry/Access (Idea) systems in which the primary application involves interactive multiterminal data entry and access.

The Model 6053 is priced at $2,290; the Model 6052 costs $1,990.

**The Model 6053 is said to be the first display to swivel on two planes.**

A hard-copy printer interface option costs $400 and the hard-copy 60 char./sec printer with interface sells for $2,500.

Quantity discounts are available from the firm at Route 9, Southboro, Mass. 01772.

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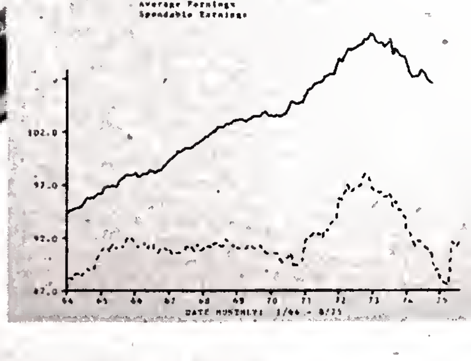

But there's still more. When you order the AJ 832 with Ultraplot you'll get AJ's Cal-Comp compatible FORTRAN software and a programming manual *at no additional charge*. Timesharing systems and in-house systems nationwide already have the software up and running.

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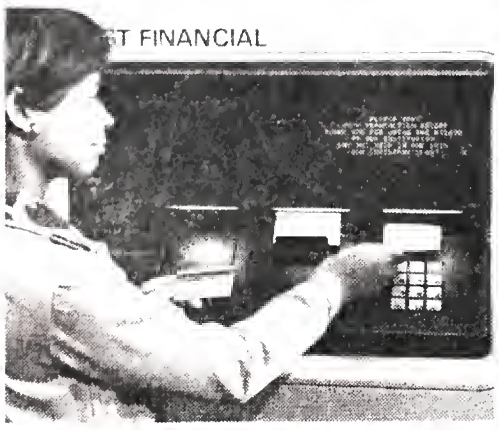
## Works With Other Vendors' CPUs

# Burroughs RT 5000 Teller Handles EFT Transactions

DETROIT – Burroughs Corp. has introduced an automated teller machine (ATM) which will reportedly perform a full range of financial services, including electronic funds transfer (EFT) from a local or remote site.



Burroughs RT 5000

An addition to the RT 2000 and RT 4000 remote teller systems, the RT 5000 utilizes a Burroughs B80 processor to drive a CRT display and console with a customer guidance panel to communicate with a bank's CPU, Burroughs said.

The RT 5000 allows a bank's customers to inquire into their account balances, withdraw cash from savings or checking accounts, charge cash withdrawals to credit cards, make deposits, transfer funds between accounts and pay bills by debiting an account with cash or a deposited check, according to a Burroughs spokesman.

An RT 5000 includes 4K bytes of read-only memory (ROM), 40K bytes of read/write memory for the transaction interpreters, generated application software, display texts and derogatory files, he said.

CPU compatibility with mainframes other than Burroughs CPUs is achieved through synchronous and asynchronous communications, he said. The respective transmission speeds for these types of operation range from 2,400- to 4,800 bit/sec and from 75- to 1,800 bit/sec.

### Multiple Mainframe Compatibility

Communications to non-Burroughs mainframes in these modes take place over dedicated or dial-up lines. Full-duplex lines are used in a half-duplex mode, resulting in half-duplex system operation, the spokesman noted.

The RT 5000 is compatible with all Burroughs CPUs, he said, and operates over 15,000-ft hard-wired cables at speeds from 1,200- to 9,600 bit/sec.

A transaction-record impact printer matched with the system operation makes an original and one copy of each transaction and can put up to four transactions per customer on one receipt, according to the spokesman.

In addition, magnetic tape cassette capability is provided with a capacity of 220K characters for the RT 5000 and can be used to record all transactions as a back-up to on-line operations, for off-line recording or for batch transmission of transactions to a CPU for account updating, the company said.

### Self-Scan Display

The CRT console of the ATM has a self-scan plasma display for messages up to 256 characters in length. The console also contains a standard 10-key numeric keyboard with additional "yes" and "no" keys, the spokesman noted.

The system is operated with magnetically encoded plastic cards with a choice of magnetic stripe options; the RT 5000 card reader will accept only cards encoded with the proper stripe configuration, he said.

In operating the ATM, a customer inserts the card which opens a security door providing access to the display and keyboard.

After entering a personal identification number (PIN), the customer selects the transaction desired and, by entering dollar amounts and depressing the "yes" or "no" keys, completes the transaction. Any two denominations of bills are dispensed in quantities up to 30.

The RT 5000 ranges in price from $25,000 to $40,000; $32,000 is the cost of a typical system. Lease rates range from $860/mo to $1,400/mo on a one-year contract, according to the spokesman.

Initial deliveries will begin in the second quarter of 1977, he said from company headquarters in Detroit, Mich. 48232.

# ASC Unit Corrects For Satellite Delays

GERMANTOWN, Md. – The Satellite Delay Compensation Unit (SDCU) from American Satellite Corp. (ASC) is said to compensate for propagation delay in satellite data communications.

When a satellite circuit is used for data transmission at rates over 2,400 bit/sec under Automatic Repeat Request Stop-and-Wait line control such as with IBM's Bisync or Hasp Multileaving, the loss in efficiency is encountered, ASC said.

The SDCU is placed between a user's terminal equipment and modem. The unit is compatible with the terminal through a standard RS-232 interface and emulates the remote equipment in its response, according to an ASC spokesman.

### Restructures Data Blocks

Internally, the SDCU restructures the data blocks to be transmitted for efficient transmission over the satellite link, he said.

At the remote end, the data blocks are restored to their original formats for presentation to the terminal. Consequently, ASC claimed, the SDCU will allow throughput which is limited primarily by the basic transmission rate of the line and by the capability of the terminal to utilize the line.

The domestic satellite communications company has not yet decided on a price for the unit or if there should be a charge at all for users of ASC facilities, the spokesman noted from ASC headquarters at 20300 Century Blvd., Germantown, Md. 20767.

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# TRW Has Modular Units For Bank Transaction Systems

LOS ANGELES – TRW introduced four modular products that reportedly expand a financial institution's options in setting up teller windows to handle specific types of transactions.

The products include a microprocessor-based CRT inquiry terminal, a passbook print station that can be shared by up to eight tellers, a customer-operated inquiry terminal and an alphanumeric typewriter keyboard for on-line inquiry and updating functions.

The modular devices are controlled by TRW's programmable communications terminal processor, which interfaces an institution's transaction-processing system with all CPUs utilized in the institution's data centers, according to TRW.

The Model 510 micro-based CRT terminal features a 480-character display in a 13-line format with 40 char./line plus a 512-character buffer, the company said.

The Model 510 can be combined with any TRW teller terminal to display on-line customer account information such as balances, holds and cautions.

One or two of the alphanumeric typewriter keyboards can be linked to a single CRT for input and inquiry to a central information file, including on-line name and address updates and other maintenance routines, TRW said.

TRW's Model 810 passbook print station can be used in combination with the firm's banking and statement savings terminals or the Model 510 CRT terminal, the company noted.

The Model 810 prints on standard passbooks as well as inserted documents such as checks, money orders and teller slips; it can be shared by up to four terminals serving eight tellers, prints at 30 char./sec and features end-of-form sensing and alert, centerfold skip and an error light, TRW said.

Entry of a customer account number or teller identity number can be required for accuracy and security when the printer is shared, the company noted.

Also introduced was the customer-operated inquiry terminal, which TRW said is about the size of a telephone. It can be placed in bank lobbies to allow customers access to savings, checking or NOW account information.

Information is displayed on the inquiry terminal on an eight-digit display: two models are available, with one incorporating a magnetic card reader.

The price of a Model 510 CRT inquiry terminal with one alphanumeric keyboard is $2,450. The Model 810 passbook print station varies in price according to the number of tellers supported and starts at $3,950, according to a TRW spokesman.

The price of a TRW customer-operated inquiry terminal begins at $385, according to the company at Suite 620, 9841 Airport Blvd., Los Angeles, Calif. 90009.

# Big Costs Plague Small Users

*(Continued from Page 29)*

Time-sharing data transfer rates are limited by the input capabilities of the user, so terminals operate in the range of 100- to 1,200 bit/sec.

Holding times are long – typically five minutes to 20 minutes – "on a per-user basis; computer utilization is very low and computing charges build up slowly; therefore, communications charges dominate much more than in the nonreal-time case," Curran pointed out.

The notion of computers as message switchers grew out of the file-sharing experience of time-sharing and the capabilities of sophisticated networks like the Advanced Research Projects Agency Network (Arpa net).

Stock exchange, police information and transportation reservation systems make use of the flexibility provided by message switching in addressing capabilities, in storage and presentation format and in its adaptation to different terminal types, Curran explained.

The effect of message switching on telecommunications networks has been small so far, he said. Terminals here also operate in the range of 100- to 1,200 bit/sec, and holding times vary from one minute to three minutes.

"Thus they impose no more drastic traffic loads than does time-sharing," Curran stated.

### Transaction Services

"We are now experiencing a large increase in transaction-type services," Curran said, noting these services range from point-of-sale outlets in large retail stores through simple credit-checking systems in small sales outlets to environmental monitors in remote locations.

"Dramatic" effects result from the geographic spread of data services and the traffic-handling requirements of the networks since the transactions may involve only a few hundred bits of information, but must be completed in a very few seconds, Curran said.

Data transfer rates range from 100- to 2,400 bit/sec. Holding times for inquiry response applications are 10 seconds to 40 seconds while those for data collection activities are one minute to over eight minutes, he added.

### Four Classes of Facilities

In responding to the needs of all of these teleprocessing users, telecommunications carriers have developed four classes of facilities, according to Curran.

These include "leased-line – suitable for a user with very large quantities of data to transmit; telephone network – suitable where ubiquity is essential or where usage for data is low; circuit-switched – suitable when data communications approaches continuous use of the bandwidth for the duration of the call; and packet-switched – particularly suitable for bandwidth not continuously used for the duration of the call.

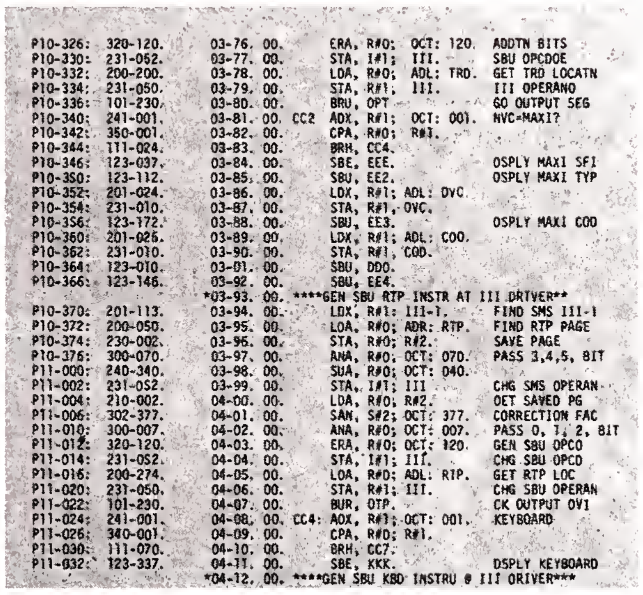
"The optimum choice between these offerings is not simple," Curran told the FCC. "No single solution adequately caters to all user needs.

"We shall require a mixture of private-line, circuit-switched and packet-switched facilities for the foreseeable future," he predicted.

The availability of these options has significantly reduced the cost of intercity transmission and improved performance at the same time, Curran said.

"The introduction of digital satellites will further reduce the cost of intercity traffic," but will probably have little effect on costs for "casual users in the smaller cities," he added.

You Don't Have to Know This . . .



```
P10-326:  320-120.   03-76. 00.      ERA, R#0;  OCT: 120.  ADDTN BITS
P10-330:  231-052.   03-77. 00.      STA, I#1;  III.       SBU OPCDOE
P10-332:  200-200.   03-78. 00.      LDA, R#0;  ADL: TRD.  GET TRD LOCATN
P10-334:  231-050.   03-79. 00.      STA, R#1;  III.       III OPERANO
P10-336:  101-230.   03-80. 00.      BRU, OPT              GO OUTPUT SEG
P10-340:  241-001.   03-81. 00. CC2  ADX, R#1;  OCT: 001.  NVC=MAXI?
P10-342:  350-001.   03-82. 00.      CPA, R#0;  R#1.
P10-344:  111-024.   03-83. 00.      BRH, CC4.
P10-346:  123-037.   03-84. 00.      SBE, EEE.             OSPLY MAXI SFI
P10-350:  123-112.   03-85. 00.      SBU, EE2.             OSPLY MAXI TYP
P10-352:  201-024.   03-86. 00.      LDX, R#1; ADL: DVC.
P10-354:  231-010.   03-87. 00.      STA, R#1, OVC.
P10-356:  123-172.   03-88. 00.      SBU, EE3.             OSPLY MAXI COD
P10-360:  201-026.   03-89. 00.      LDX, R#1; ADL: COO.
P10-362:  231-010.   03-90. 00.      STA, R#1, COD.
P10-364:  123-010.   03-01. 00.      SBU, DDO.
P10-366:  123-146.   03-92. 00.      SBU, EE4.
                    *03-93. 00. ****GEN SBU RTP INSTR AT III DRIVER**
P10-370:  201-113.   03-94. 00.      LDX, R#1: III-1.      FIND SMS III-1
P10-372:  200-050.   03-95. 00.      LOA, R#0; ADR: RTP.   FIND RTP PAGE
P10-374:  230-002.   03-96. 00.      STA, R#0; R#2.        SAVE PAGE
P10-376:  300-070.   03-97. 00.      ANA, R#0; OCT: 070.   PASS 3,4,5, BIT
P11-000:  240-340.   03-98. 00.      SUA, R#0; OCT: 040.
P11-002:  231-052.   03-99. 00.      STA, I#1; III         CHG SMS OPERAN
P11-004:  210-002.   04-00. 00.      LDA, R#0; R#2.        OET SAVED PG
P11-006:  302-377.   04-01. 00.      SAN, S#2; OCT: 377.   CORRECTION FAC
P11-010:  300-007.   04-02. 00.      ANA, R#0; OCT: 007.   PASS 0, 1, 2, BIT
P11-012:  320-120.   04-03. 00.      ERA, R#0; OCT: 120.   GEN SBU OPCO
P11-014:  231-052.   04-04. 00.      STA, I#1; III.        CHG SBU OPCD
P11-016:  200-274.   04-05. 00.      LOA, R#0; ADL: RIP.   GET RTP LOC
P11-020:  231-050.   04-06. 00.      STA, R#1; III.        CHG SBU OPERAN
P11-022:  101-230.   04-07. 00.      BUR, OTP.             CK OUTPUT OV1
P11-024:  241-001.   04-08. 00. CC4: AOX, R#1; OCT: 001.   KEYBOARD
P11-026:  340-001.   04-09. 00.      CPA, R#0; R#1.
P11-030:  111-070.   04-10. 00.      BRH, CC7.
P11-032:  123-337.   04-11. 00.      SBE, KKK.             DSPLY KEYBOARD
                    *04-12. 00. ****GEN SBU KBD INSTRU @ III DRIVER***
```

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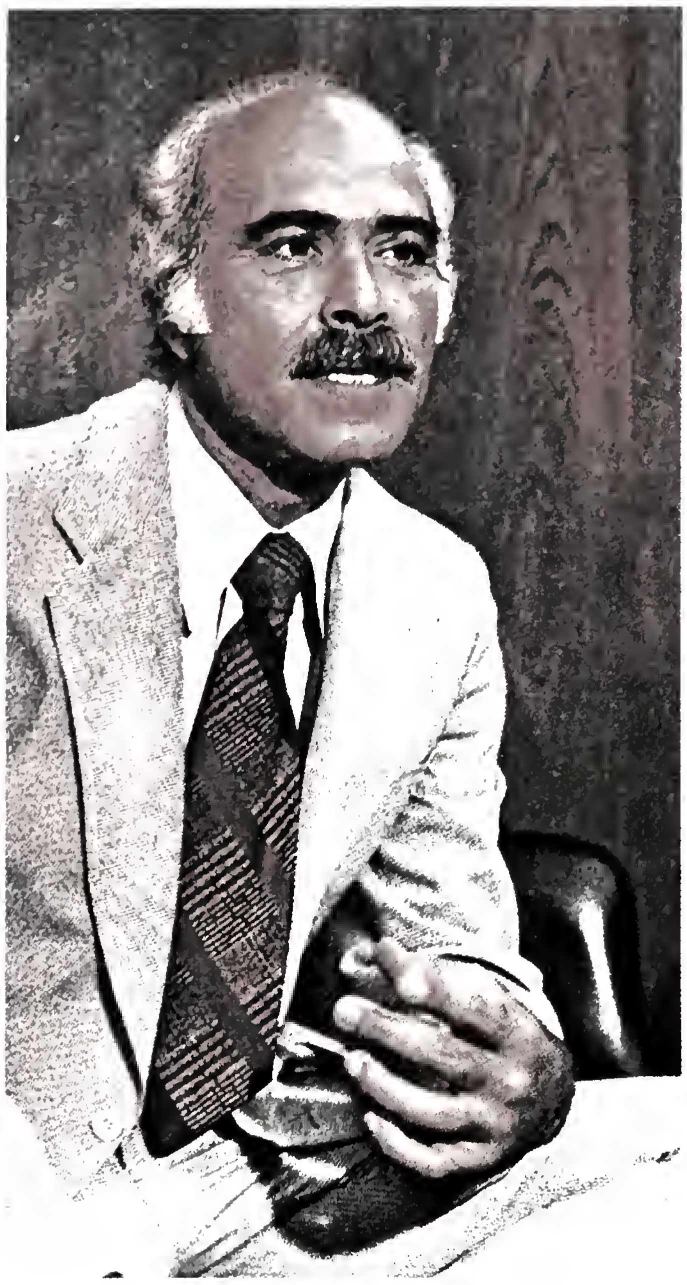

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*Dart International, Los Angeles, California*

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# Informer R-301 CRT Designed For Use on Factory Floors

LOS ANGELES – A small, heavy-duty CRT/keyboard display terminal designed for factory floor environments has been introduced by Informer, Inc.

Informer Model R-301

The Model R-301 industrial rack-mounted terminal is aimed at machine control or factory data collection and transmission applications, according to an Informer spokesman.

Each R-301 terminal provides the standard keyboard configuration, but with keys spaced slightly closer together for use by factory personnel in a "hunt-and-peck" data entry manner, he said.

The keyboard is located on the side of the 5-1/2-in. CRT and is situated behind a hinged Plexiglass door to prevent accidental data entry.

The R-301 CRT screen has a glare reduction mask and displays up to 512 characters in 16 lines of 32 char./line, the spokesman noted, adding the unit has a standard RS-232 interface and operates at any data rate from 110- to 9,600 bit/sec in both half- and full-duplex modes.

The device is capable of operating on normal brownout voltage levels and can be installed in standard 19-in. computer racks or other machine cabinetry, he said.

The Model R-301 terminal is priced at $1,890. Informer is at 8332 Osage Ave., Los Angeles, Calif. 90045.

## Terminal Transactions

# Megatek 6014 Offers Upgrade To Users of Tektronix Plot 10

SAN DIEGO – Designed as an upward-compatible unit to the Tektronix, Inc. 4014, Megatek Corp.'s Megraphic 6014 graphics CRT terminal system enables Tektronix Plot 10 users to add dynamic vector refresh to their existing applications software, Megatek said.

The Megraphic 6014 is fully compatible with all Tektronix Terminal Control System (TCS) software and can directly replace any existing Tektronix 4014 terminal, the vendor added.

It is an intelligent refresh terminal that can be upgraded into a stand-alone system, Megatek said. The basic configuration includes a Data General Corp. (DG) Nova 3 general-purpose CPU with 8K 16-bit words of 700 nsec memory; a 17-in. monitor; Megatek's proprietary MG 752 graphic processor; and an Ascii keyboard with joystick, the company said.

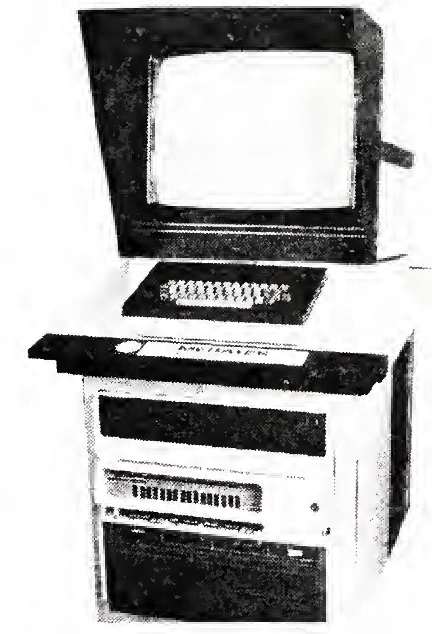
The system also comes with an RS-232 interface, a table with an equipment rack and Megatek's 4014 emulator and Enhanced Dynamic Software package. The emulator, the firm noted, enables the CPU to interpret TCS Plot 10 commands and display them in refresh.

System options include a large CRT, memory up to 128K words, floppy- and hard-disk peripherals, data tablet/digitizer and plotter.

Because selective changes can be made in the CRT terminal, communications requirements with the host are reduced, leaving more CPU time for problem solving, Megatek said.

The DG Nova 3 is also available as a general-purpose machine with full programmer console features and ready access to all CPU and I/O functions.

Depending upon configuration, the Megraphic 6014 sells for about $16,000. Megatek is at 1055 Shafter St., San Diego, Calif. 92106.



Megatek Megraphic 6014

### Telco Booster Helps Signals

GLEN COVE, N.Y. – Telco Products Corp. has a base station, preamplifier and back-lit "On-the-Air" sign it said boosts weak communications signals up to 25 db.

The Base Booster also reduces strong signals to -4 db and will sense when the transceiver is keyed, switching the preamplifier off during transmission and lighting the "On-the-Air" sign, Telco said.

The Base Booster costs $59.95, Telco said from 44 Seacliff Ave., Glen Cove, N.Y. 11542.

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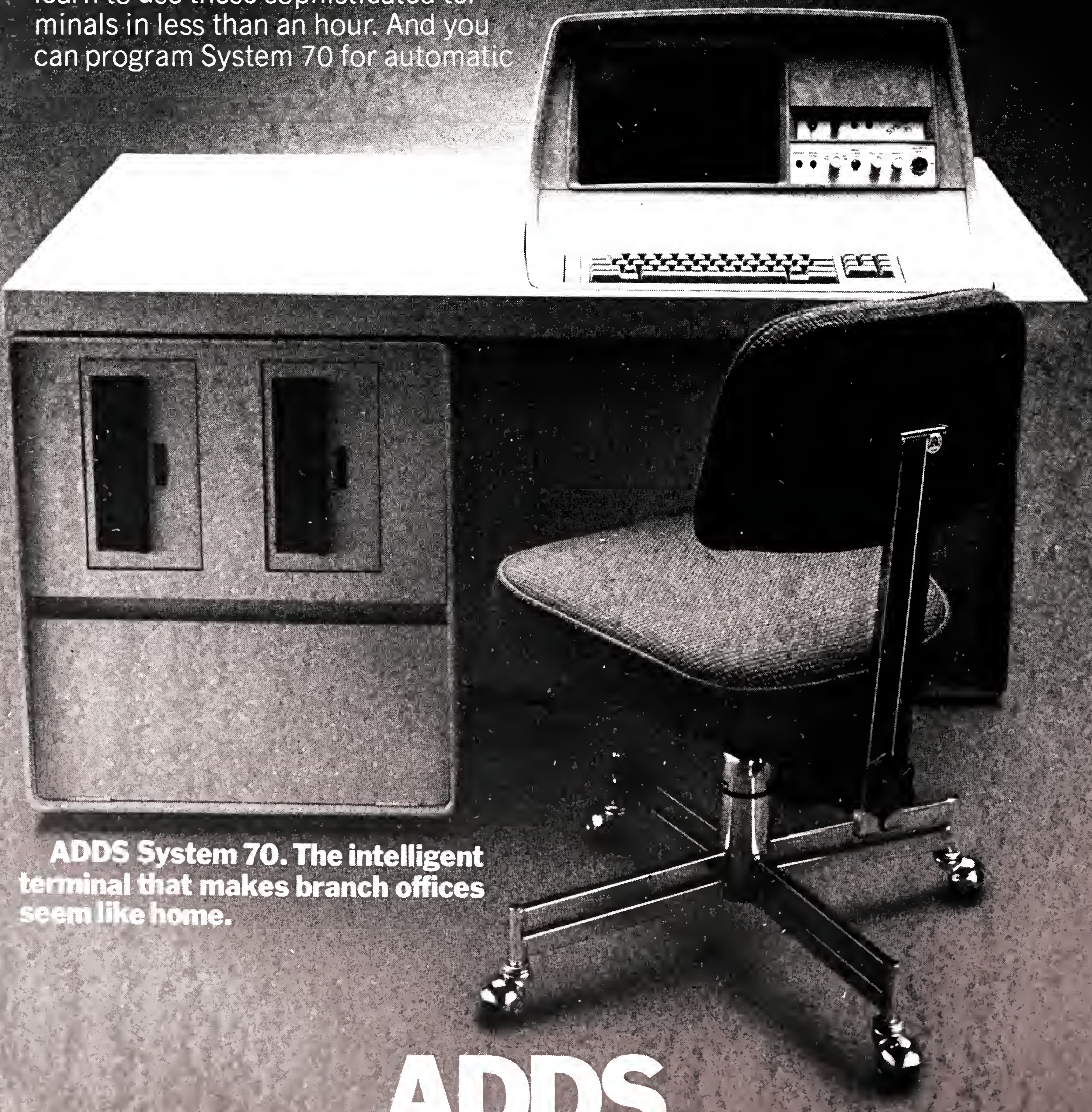

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# CON FIGURE A WINNER

Data Communications Network Configurations
A Computerworld Special Report
November 29, 1976

# Bell Phone Net Still Mainstay of Data Communications

By Fonnie H. Reagan
Special to Computerworld

During the past five years, many innovative communications services have been announced and made available to the computer user for transmitting data among his places of business. However, the public telephone network and leased, voice-grade, terrestrial lines remain the mainstay of data communications links.

| | |
|---|---|
| Private telegraph-grade lines: | 12% |
| Private voice-grade lines: | 74% |
| Private wideband lines: | 11% |
| DDD (public telephone network): | 47% |
| In-Wats: | 14% |
| Out-Wats: | 26% |

**Figure 1. Summary of Communications Facilities Usage.**

In a survey made by Datapro Research Corp. in late 1975, a total of 444 users responded with communications line usage and/or rating information. One of the questions asked what facilities were used. A summary of the results (Figure 1) shows the pattern of usage in percentage of the total number of users responding.

In the survey, users were also asked to rate the services they used. The pattern of carriers supplying services to the 444 users responding was as shown in Figure 2 and the ratings given to individual services by these users are summarized in Figure 3.

The remainder of this article is devoted to a discussion of the public telephone network and private voice-grade lines as provided by the Bell System, because these are by far the most commonly used facilities.

The first element in Bell's Direct Distance Dialing (DDD) network connects subscriber stations (telephones) via a station loop to their serving central office, or end office. Multiple end offices in the same city are connected by interoffice trunks.

When different cities are involved, the call is passed from an end office via a toll connecting trunk to a "toll office" via an intertoll trunk. From there the call is routed to another "toll office." Then the call is forwarded via an end office in that area.

The intertoll trunking forms an elaborate and extensive nationwide switching hierarchy. Typically, there are four geographically separate levels of switching making up the toll office arrangements: Toll, Primary, Sectional and Regional centers, which are also referred to as Class 4, 3, 2 and 1 offices. (The end office is referred to as a Class 5 center.)

Calls proceed up the hierarchy until a path is found toward the destination toll center. Shunts, called high usage trunks, are established where large interoffice traffic flows warrant. They expedite call completion and relieve network congestion.

**AT&T/Bell System: 432 responses.**

**Other telephone companies: 70 responses.**

**MCI: 13 responses.**

**Southern Pacific Communications: 5 responses.**

**Western Union: 34 responses.**

*The responses total to more than the 444 users because many used services from more than one carrier.*

**Figure 2. Number of Respondents Supplied Each Service.**

| | Number of Responses | Ease of Installation* | Reliability of Operation | Quickness to Troubleshoot and Correct Problems* |
|---|---|---|---|---|
| **Telephone network** | | | | |
| **AT&T/Bell System** | 33 | 3.2 | 3.1 | 2.6 |
| **Other telephone companies** | 10 | 2.7 | 2.5 | 1.6 |
| **Private voice-grade lines** | | | | |
| **AT&T/Bell System** | 154 | 3.2 | 3.1 | 2.6 |
| **Other telephone companies** | 24 | 2.4 | 2.8 | 2.0 |
| **MCI** | 13 | 3.0 | 3.2 | 2.9 |
| **SPCC** | 5 | 2.2 | 3.2 | 3.0 |
| **Western Union** | 11 | 2.3 | 2.4 | 2.0 |

**Weighted averages, based on a scale of 4 for excellent, 3 for good, 2 for fair and 1 for poor.*

**Figure 3. User Ratings of Carrier Facilities.**

The many possible variations in call routing have been a speed-limiting factor in the use of the DDD network for data transmission. Variations in circuit characteristics present with the different call paths prevent modem designers from taking advantage of fixed circuit characteristics to obtain reliable high-speed transmission. Different through-network delays, interfacing between successive trunks, varying points of amplication and like factors also add to variations between calls.

Modems must be capable of operating over a typical or average path, which will generally limit operation to a lower bit rate than private line channels. Nevertheless, transmission at 4,800 bit/sec is for many users a standard for day-to-day operations on the switched network. The Bell System itself offers a modem, the Model 209, for use on the DDD network at 4,800 bit/sec.

A second limiting factor of the DDD network is that it is constrained to half-duplex operations for bit rates of 2,000 bit/sec and up. The local loop is two-wire, but this is interfaced to a four-wire transmission path via a device called a hybrid. While the transmission path can carry data both ways at once, the two different signals could not survive the hybrids and local loops. This applies to present modem technology at 2,000 bit/sec and up.

Lower-speed modems such as the Bell 100 series commonly operate full-duplex over the switched network. At least one independent manufacturer, Vadic, offers a 1,200 bit/sec unit which can operate full-duplex on two-wire service.

Half-duplex operation places another restriction on DDD performance. A typical half-duplex procedure involves sending a block of data, awaiting the acknowledgement of the block and sending the next block.

In the DDD network the time to reverse transmission direction, or "line turnaround," may be as much as 0.2 sec. Two such turnarounds occur per block, so 0.4 sec of delay is incurred.

*(Continued on Page S/8)*

## On National, International Scale

# New Family of Standards Being Developed

By Ira W. Cotton
Special to Computerworld

The past few years have been ones of significant new developments in standards for computer networking, although these developments have had little effect on users yet. An entirely new family of data communications standards is being developed and users should begin to feel their effects over the next few years.

The new standards being developed include replacements for such widely accepted standards as RS-232 at the electrical level and binary synchronous link control, as well as standards for areas not previously covered, such as packet switching.

These standards are being developed both on a national and international scale by such groups as the American National Standards Institute (Ansi), the Electronics Industry Association (EIA), the International Standards Organization (ISO) and the International Telegraph and Telephone Consultative Committee (CCITT), with considerable vendor participation. Most of these standards will be adopted for mandatory use within the Federal government by the National Bureau of Standards (NBS) and the National Communications System (NCS).

Data communications is an area of worldwide concern. The development of national standards in data communications is paced by the development of international standards. National options may be added when an international standard is adopted nationally, but it is highly undesirable (and quite rare) for a totally incompatible national standard to be adopted.

### Signaling, Call Establishment

With the data networks of the future expected to be digital from end to end, standards are being developed to interface terminals to such networks. This includes replacement for RS-232, as well as the addition of a signaling scheme to initiate and terminate calls (replacing manual dialing). Even now physical connectors are being standardized.

In the U.S., the EIA is the focus of standards activities in the electrical and functional characteristics of interfaces. The designated temporary name for its new specification has been RS-XYZ, which uses a new 37-pin connector and which will provide superior performance to RS-232.

Internationally, CCITT Recommendation X.21 adds a level of digital signaling above the electrical specifications to provide a means for synchronous terminals to initiate calls, exchange call progress signals, transmit data and terminate calls on new public data networks. The electrical specifications in X.21 are a functional subset of RS-XYZ and a new 15-pin connector is specified. This recommendation is under consideration for adoption as Ansi and federal standards.

At the link control level, ISO has been struggling over the past few years to complete all the details of a new, bit-oriented High-level Data Link Control Procedures (HDLC). The American version of this procedure is called the Advanced Data Communications Control Procedure (ADCCP).

So far international agreement has been achieved for both the frame structure and the elements of procedure (definition of the command and response repertoire). International arguments are still going on

*(Continued on Page S/22)*

## On the Inside

Net Design Technology Key to Coping With Alternatives .......... S/4
Net Configurations Require Maximum Planning .......... S/4
New Communications Ideas Seen 'More Scarce Today' .......... S/5
Technical Control Facilities Can Extend Net Efficiency .......... S/6
FCC Must View Product as Integrated Services Pack .......... S/7
Network Accommodates the Needs of Different Users .......... S/9
Multipoint Net Diagnostics Should Be Reconsidered .......... S/10
Xerox Offering Management Services via Time-Shared Net .......... S/11
Airlines Revamping Entire Data Net for More Efficiency .......... S/12
CSC Infonet Has Virtual Line-Switched Architecture .......... S/14
Nationwide Net Aids Major Mining Firm's DP Needs .......... S/17
Iowa Bank Chain Offering Paperless EFT to Customers .......... S/18
Where Can Retailers Take POS for Guaranteed Rewards? .......... S/21
Users, Not Vendors, Must Shoulder Reliability Burden .......... S/24
Shipper Planning Data Links From Europe to New York .......... S/25

**This special report was prepared under the direction of CW Deputy Editor Ronald A. Frank. Cover art by Henry Fling.**

## 'Packetizing' Avoided

# Value-Added Net Serves About 105 Host Mainframes

**By La Roy Tymes**
Special to Computerworld

Tymnet is Tymshare, Inc.'s international value-added network consisting of about 200 nodes interconnected by leased lines. It serves about 105 host computers made by 10 different manufacturers. It is designed primarily for the low-speed interactive terminal (120 char./sec or less), but also supports remote job entry and computer-to-computer file transfer.

It was first brought up as a small network of 30 nodes in November 1971 and has been in continuous operation since then. It was first designed to interface low-speed full-duplex Ascii devices to the SDS 940. It has been expanded and enhanced to interface almost any device.

Tymnet is not a packet-switched network. Packet switching was rejected because of its inefficiency in handling small units of information. Also, people, terminals and interactive time-sharing systems do not naturally communicate in terms of packets; they communicate with character streams. "Packetizing" the data before transmission to reduce the cost of packet switching is an added complexity and irritant to both user and host computer.

When a user comes on Tymnet, he identifies his terminal type, gives his name and password and possibly other information. This information is sent to the network supervisor, a central program which controls the network.

The supervisor checks the password, the desired host and other conditions to see if conditions are appropriate for a log-in. If they are, the supervisor selects the optimal path through the network and builds a virtual circuit.

A virtual circuit is a full-duplex character path between the user and a port on the desired host. It is represented by table entries in the nodes through which the circuit passes.

Between any two nodes, the data for circuits passing between those two nodes is statistically multiplexed to keep bandwidth requirements to a minimum. In a character-at-a-time mode of operation, this is several times more efficient than packet switching.

We chose a centrally controlled network rather than distributed control for several reasons:

- The nodes can be made smaller, therefore cheaper.
- The supervisor can always select the optimal path for any user at any instant, since all global information is in one spot.
- Reaction to network trauma, such as line or node failure, is very fast. Diagnostics can be performed and new routing information can be generated in seconds.
- The supervisor has the name, password (in ciphered form) and other relevant information of every network user. It therefore can act as guardian for the net and the hosts on the net, deciding who can log into what and under what conditions.
- The supervisor is a convenient place to gather accounting and diagnostic information.

The one drawback to a centrally controlled network of this magnitude is the need for a supervisor of corresponding complexity. It must operate hour after hour, day after day, handling tens of thousands of log-ins per day. It also must be totally automated, so crises can be handled quickly.

We normally maintain four supervisors, so if the one on control fails, one of the others can take over.

### User Benefits

The first benefit to the typical customer is economy. It is rare for the usual customer to have sufficient traffic volume between two points to justify his own private leased line. Wats and other approaches can get quite expensive, especially when one has an international operation.

The second benefit arises when the customer, having developed his package, attempts to deliver it to the real world. He is assaulted by bisynchronous, SDLC, X.25, half- and full-duplex, synchronous and asynchronous, Ebcdic, Ascii and many other predatory creatures of the communications jungle. If he can make it through all that to the terminal, he finds there is not just one kind of terminal, there are hundreds of them, with more coming all the time.

Let us say he has developed his package talking to one kind of terminal hard-wired to his machine. Tymnet can simulate a number of those terminals and handle all the translations between those simulated terminals and the real world. The more sophisticated and ambitious customer can interface to our virtual terminal, a software construct which allows flexibility in talking to the ultimate real terminal, yet shields the application program from the infinite variations of real terminals.

> *'The one drawback to a centrally controlled network of this magnitude is the need for a supervisor of corresponding complexity.'*

The third benefit arises when the product is in the field and being delivered to end users on a regular basis. Ordering telephone lines, chasing down their failures, installing communication equipment and similar problems associated with a communications system is a specialized and nontrivial operation. It is one of those things that takes far more time and resources than at first seems reasonable. With an interface to a network the customer can usually forget those problems.

Other services of Tymnet include an absolute time reference. The supervisor is monitoring the National Bureau of Standards and can pass this time to any host. This avoids operator errors in entering the time when a system is brought up.

We provide user statistics, so our customer can get various profile data on his end users. We also provide all accounting data to assist in generating billing. We support all character sets, plus raw binary data, in all nodes. Every link between nodes has full error control and can accommodate anything short of line outage.

Since our system runs all the time, we can automatically log into and run jobs on any

(Continued on Page S/22)

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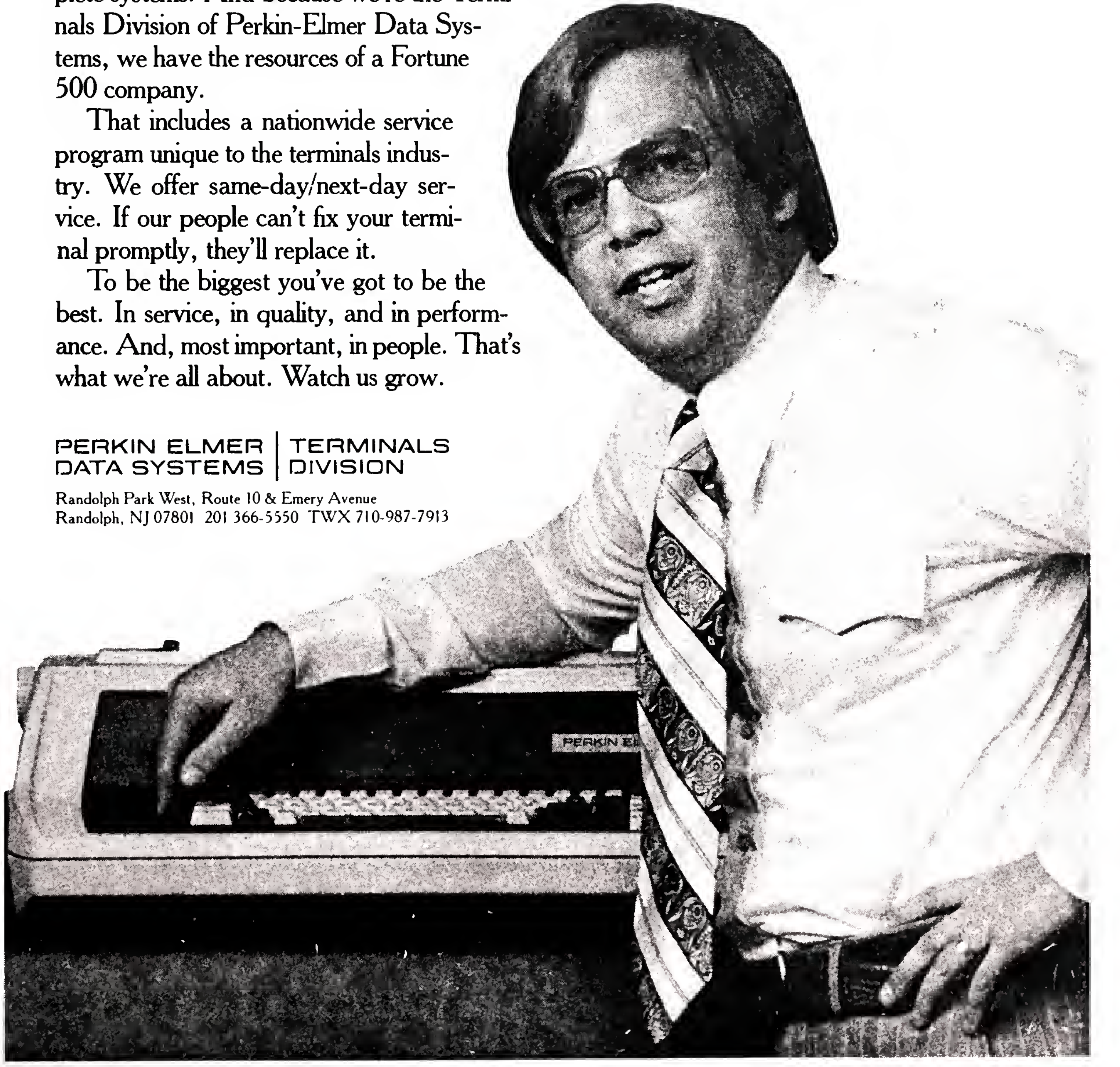

### *With a Multiplicity Available*

# Net Design Technology Key to Coping With Alternatives

**By Howard Frank**
Special to Computerworld

An important key to coping with the multiplicity of alternatives available for implementing a network is network design technology, which has advanced from primitive origins ony a few years ago to a major position in network planning during the 1976-1980 time frame.

Network analysis and design evolved from an art, based on rules-of-thumb and intuition to a pseudoscience, based on mathematical formulas derived from queueing theory and combinatorics, and back to an art, based on the iterative application by computer of human-suggested heuristic techniques.

Rudimentary network design was heavily dependent on simple rules garnered from experience. Rules such as "the average utilization of a communications line should not exceed 50% or 60%" were employed because designers had discovered that if such limits were substantially exceeded, excessive time delays often occurred. Such rules avoided the need for all but the most elementary time delay analyses.

A typical rule for simplifying the multidrop line design problems was "connect a new terminal to the nearest already constructed multidrop line with available capacity." Such a rule radically reduced the number of design alternatives that could be considered.

> *'The best approach to analysis is based on the "judicious" combination of analytic and simulation techniques. Many portions of the overall analysis problem have straightforward analytic solutions while others are exceptionally difficult and best treated by simulation.'*

Rules of this sort were often adequate for simple system development. As systems became more complex, however, the usefulness of intuition as an effective analysis and design tool diminished.

### Simulation Next But Defective

Instead, simulation became the major design aid. Simulation was usually employed in the following manner:

- A design for the network was developed via manual, intuitive techniques.
- A detailed computer-based simulation model for the network was developed and extensive simulations were performed.
- The designer searched the output of the simulations for bottlenecks, departures from expected operation and insights into design improvements.
- If time, money, and energy were left, the first three steps were repeated.

The simulation approach to design has several defects. The development of a detailed simulation program is costly and time-consuming, as is the operation of the program.

Searching computer output for potential system defects is, at best, risky; more often than not, the results are stacks of unread paper.

Moreover, unless the development and use of the model is carefully planned, its results may be statistically invalid.

### Queuing Theory

The next step in the development of design aids was the attempted replacement of simulation as an analysis technique by analytic methods based on queueing theory.

The analytic methods were fast and relatively inexpensive to apply. In addition, the relative simplicity of the results often generated insight into the factors influencing overall system performance.

However, purely analytical approaches to analysis often led to intractable mathematical problems. These could only be solved by making assumptions not valid in the real world; until a system was actually built, there was no easy way to check the sensitivity of the system to the "solvability" assumptions.

The best current approach to analysis is based on the "judicious" combination of analytic and simulation techniques. Many portions of the overall analysis problem have straightforward analytic solutions while others are exceptionally difficult and best treated by simulation.

The combination of both approaches into a single unified analysis technique has been shown to lead to more accurate, less costly and more rapidly obtained solutions than those generated by "pure" analytic or simulation procedures.

### Node Exchanges

The goal of the network optimization is to provide a "robust" network design which meets all design constraints and has the lowest possible cost. The most effective topological design techniques for computer-communication networks involved the heuristic application of a family of optimization procedures called "node" or "link" exchanges.

Exchange methods are search procedures which optimize network structure by sequentially changing small sections of a larger network. That is, small pieces of the

*(Continued on Page S/28)*

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# Net Configurations Require Maximum Planning

**By M. Glen Looney**
Special to Computerworld

In recent years high-volume, long-distance data communications users have been offered a number of alternatives to dedicated, leased-line service. These offerings are generally based on combining the traffic from a number of users to create sufficient volume to justify the cost of large capacity communications facilities. Packet switching, satellite channels and private microwave facilities are examples of these newer services.

Unfortunately, similar alternatives have not become widely available on "local loops" which are the necessary element for distributing large amounts of terminals to those points of transactions "where the action is." Local loops are even necessary if a company chooses to take advantage of the newer long-haul services. Whether the application is order entry, reservations or point-of-sale, the same considerations for local loops generally apply.

Advances in modem technology provide many cost-effective choices in line speed, dialed backup, etc. The cost for low-speed (300 bit/sec to 2,400 bit/sec) dedicated, multidrop local facilities, however, are still a function of mileage and drop charges; and these rates are usually set on an intrastate basis and may change at any time for any portion of a widely spread network.

Since, in general, the local loop component of any network is the least controllable element in budgeting for communications costs, as much planning as possible should be dedicated to configuring terminal networks.

In each state, the rates for mileage and drop charges are set by the utility commission of that state. Although the services offered by each telephone operating company are similar, the costs for the services vary widely. The two primary items in service fees are mileage charges and drop charges.

In some areas there is no mileage charge if a circuit goes between contiguous rate centers and has drops in each rate center. Some states charge a flat rate per airline mile of circuit run. Some states have relatively high drop charges; some states have no drop charges.

Thus the costing of the local loop portion of a network can have many variables. In order to understand what a company is faced with, it is advisable to consult with terminal and equipment vendors, other companies in the area who may have faced this problem previously, consultants who specialize in costing and planning networks and the local telephone company salesman and his technical people.

Preliminary discussions with telephone company personnel should be conducted even prior to deciding what the local network will look like. These early discussions to get the ground rules defined can have a definite effect on such network considerations as:

- How many circuits.
- How many drops per circuit.
- Where computers and concentrators

*(Continued on Page S/23)*

Ralph G. Berglund
Consultant In Data Communications
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# New Communications Ideas Seen 'More Scarce Today'

**By Edith Holmes**
Of the CW Staff

WASHINGTON, D.C. — Innovation in the computer communications industry has dropped dramatically in the last four years, despite the development of good quality data transmission networks, according to Vinton G. Cerf of the Information Processing Techniques Office at the Defense Department's Advanced Research Projects Agency and Alex Curran, president of Bell Northern Research, Inc.

Ideas for new telecommunications services are more scarce today than they were when communications facilities were inadequate, they told the Federal Communications Commission (FCC) at a planning conference here recently.

In light of this demoralized climate, Cerf and Curran urged the FCC to make regulatory decisions that will encourage and stimulate innovation in the industry.

The conference was a technical information session on communications, sponsored by the American Federation of Information Processing Societies (Afips).

Since Afips takes a neutral position on policy matters, Cerf and Curran did not feel they could offer solutions to the regulatory dilemmas faced by the commissioners, they said.

Cerf and Curran did, however, advise the commission to ensure that a sufficient set of standards are created so the interconnection of prime services is feasible.

This would create a climate in which computing and carrier interests would profit from the installation of reliable facilities and broaden the base from which capital can be acquired in the hope of eliminating a potential constraint to the growth of the telecommunications industry.

### ICCC Observations

Cerf's and Curran's contention that there is a lack of innovation in the field at present is based on observation of the International Conference on Computer Communication (ICCC) which held its first meeting here in 1972.

The future of computer communications looked bright then, they noted. One conference participant expressed ICCC's mood when he said, "during the 1970's, the revenue from machines conversing will surpass that of people conversing."

Only one of the 22 papers defining new, innovative computer-based communications services at that first conference "painted a restrained picture," Cerf and Curran noted, adding that even at the time its author was considered "a reactionary."

Then, "the realities of implementing distributed computing services" hit and the number of service papers at the 1974 ICCC dropped to 12, Cerf and Curran said.

Just three months ago, the 1976 ICCC met and only four papers described new telecommunications services.

These three ICCC's led Cerf and Curran to conclude there has been "a very gross underestimation of the difficulty of creating and maintaining large data bases."

In addition, "no significant progress has been made on designing and implementing systems by which authors may be paid a royalty for the use of information they have prepared" for a data base, they said.

### Growing Slowly

Computer-assisted instruction is growing very slowly, Cerf and Curran noted. "Again, the start-up problems were grossly underestimated."

Some progress has been made in automating library service systems, but in most cases librarians trained in their protocols are needed to enable users to get at the information they contain, they said.

Finally, they concluded no home services have been developed. "The costs are clearly too high, except for dedicated hobbyists."

Computer communications technology "is being applied only in the business sphere where the major uses are applied to reduce the cost of existing functions," Cerf and Curran stated.

In part, because of their importance to the business sector, electronic funds transfer (EFT) systems, point-of-sale systems (POS) and electronic mail will be the chief areas of growth in telecommunications in the next decade, Cerf and Curran predicted.

But implementation of these fields will be slow and their communications impact will be small — only 7% of the size of voice communications in 1986.

Local access will continue to account for communications costs that are higher than they need be, and a great deal of capital will be required for terminals and mainframes, Cerf and Curran projected.

### EFT Prospects Promising

Overall, the prospects for EFT systems look the brightest. By 1986, EFT systems traffic could reach 67.7 x $10^9$ checks processed or 1.27 bit/year x $10^{14}$. The communications costs will be $175 million and 90% of this capital will be eaten up by local loop requirements, Cerf and Curran said.

About $450 million will be required for the terminals in such an expanded EFT system and additional computer installations will cost $150 million.

According to Cerf and Curran, the benefits of this EFT system will be as follows: annual communications revenues will be $42 million; annual computing revenues, $210 million; and the cost per check will be approximately half a cent.

> *'No significant progress has been made on designing and implementing systems by which authors may be paid a royalty for the use of information they have prepared.'*

A universal POS-EFT network, linking all banks and all retail outlets in the U.S. by 1986, would cost nearly $20 billion in telecommunications facilities and $80 billion in terminals and computing systems, Cerf and Curran predicted.

"The investments would generate annual telecommunications revenue of $5 billion and annual computing revenue of perhaps $20 billion exclusive of the costs of computing hardware, software and systems maintenance," they said.

The average cost of processing each transaction would be five cents and that figure would be too high for small retail stores, they added.

### Electronic Mail Costly

Based on time-sharing plus word processing, electronic mail which can cost as much as $3 per message is too costly to be practical.

Before electronic mail becomes a real possibility, terminal rental, for example,

(Continued on Page S/28)

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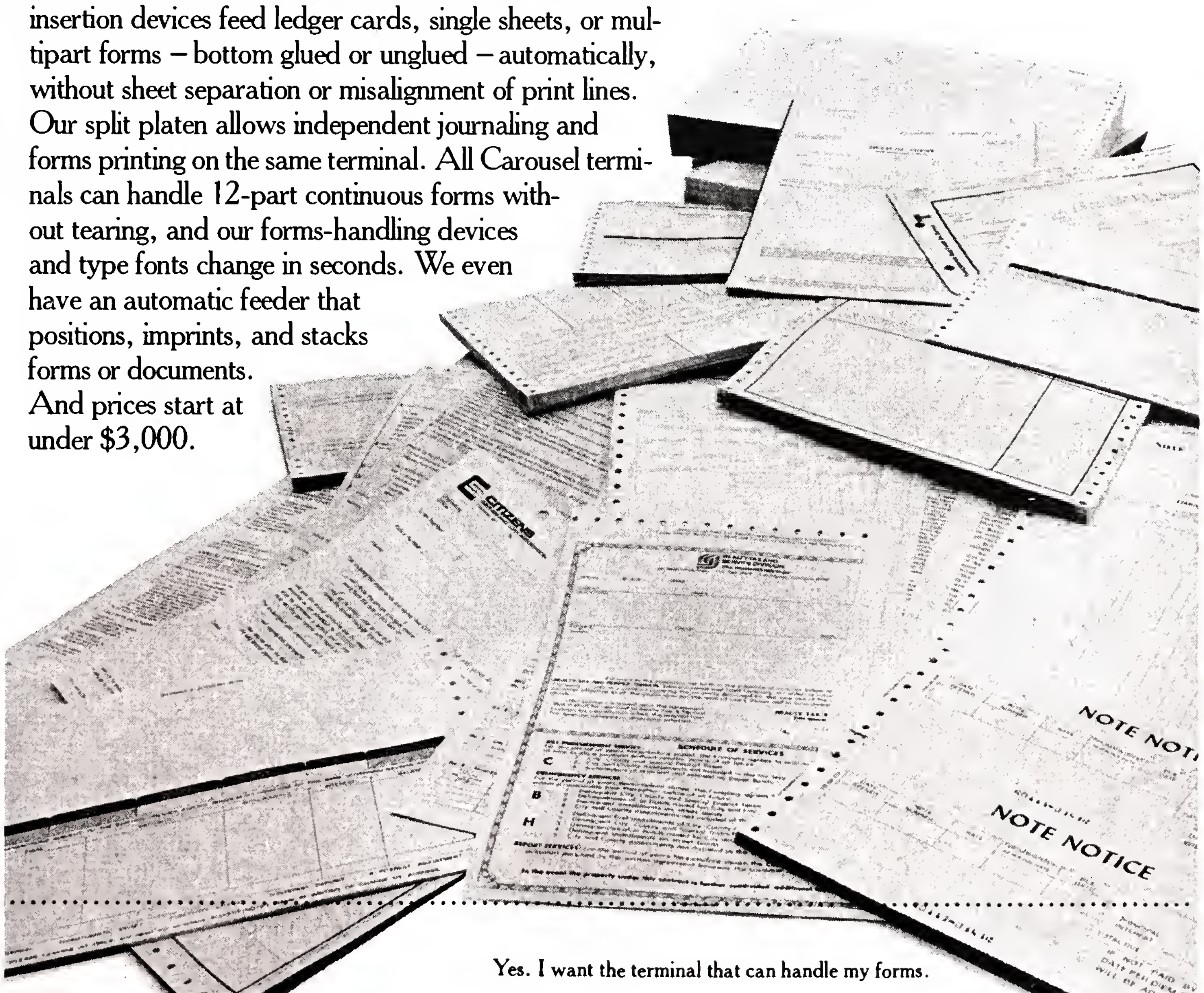

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# Technical Control Facilities Can Extend Net Efficiency

By Boyce M. Adams

Special to Computerworld

Teleprocessing has grown up out of two distinct disciplines. On the one hand, DPers come to us from the computer industry, which did not always recognize the necessity for efficient data communications. On the other hand, the classical communicators come to us from a long tradition of Teletype and voice services activities, usually with little involvement in DP.

The merging of these two disciplines is not yet complete and the differences between them are apparent, not only in the organization of DP and communications departments, but also in the design of both the hardware and the software which is used.

This is perhaps not too surprising, since the marriage between computers and communications was preceded by a rather long engagement. During the courtship, the computer industry continued to develop its technology with little regard for the needs of the communicator while the communicator struggled to convert a domestic telephone network which had been designed and optimized for voice communications into an effective instrument for use in the transmission of data.

### Component Subdivision

The result is the subdivision of a total teleprocessing system into a number of components — mainframe, transmission control units, local modems, transmission links, distant modems, remote or local terminals and remote or local minicomputers.

The computer mainframe and the remote terminal represent the highly developed technology of the computer industry where users deal in sophisticated programming languages which simplify their task tremendously.

The transmission link represents the highly developed technology of the communicator, where information is dealt with in terms of electrical voltages and currents and where characteristics are described in terms of phase shift and frequency response, all engineering terms.

> *'It is therefore vital that the total system be separable into its component parts before any meaningful diagnosis of faults can begin.'*

The modem and the communications controller represent the link between these two technologies and together they perform an essential conversion from one discipline to another.

However, as DP professionals are too painfully aware, this multiplicity of disciplines and the resultant multiplicity of suppliers can develop into a nightmare when it comes to assigning responsibility for correcting malfunctions.

It is therefore vital that the total system be separable into its component parts before any meaningful diagnosis of faults can begin. It is a need that is answered by technical control centers (TCC), as Spectron Corp. calls its system, or network control systems, as other offerings are named.

The TCC provides that separability and is essential in any well-conceived plan to provide diagnostics for data communications. However, it need be only as complex as the needs and tastes of its users dictate.

Beginning with the simple requirement for shelves to hold modems, the need progresses rapidly to some reliable yet simple means to substitute good modems or lines for bad ones; and eventually to the necessity for adequate test facilities so that performance can be measured and technical difficulties resolved.

### New Way Needed

Today's complex, remote data communications environment demands a new way of monitoring, diagnosing, compensating and correcting the diverse elements in such a network. And providing preventive maintenance services as well.

The need, one just now being realized as data communications networks mushroom in size and complexity, is for a simple, efficient way of assuring a DP installation that it is providing the required grade of communications services to its users.

It is not a simple task when you look at what goes into a large-scale data communications network.

TCC, however, make the job simpler by concentrating in a specially designed facility the centralized control to quickly and easily locate and diagnose problems anywhere in a network and restore service quickly to a remote site even when phone line or modem fails.

### Problems Easily Identified

Problems are easily identified with a TCC because of the inherent flexibility which allows any line to be patched to any modem, and any modem to be patched to any port. It can be determined whether a problem lies in the telephone line, the data terminal, the transmission equipment, the front end, CPU, or perhaps an erring operator.

The TCC permits on-line checks to be performed with its test equipment which can pinpoint a malfunction with a minimum of disruption to the network.

Experienced data communications users find telephone lines usually do not just go down. Instead, they degrade. Since the TCC can diagnose this condition with its test equipment, it may be used to conduct routine line checks and thus help to avoid more serious problems later.

Similar testing procedures may be conducted to determine unacceptable high levels of noise on a line that causes distortion and inaccurate data transmission.

To carry out the technical control concept of centralized control, monitoring and testing, the facility must be located at the hub of the transmission network. Location at the hub provides access to the primary switching, multiplexing and control equipment and to the concentration of modems serving the communication lines to distant terminals.

### Importance of Proximity

The importance of this proximity to the major concentration of equipment — besides the obvious advantage of having the equipment accessible to technical control personnel — lies in the necessity for "bringing" the interfaces of equipment and lines to the technical control facility equipment racks or console.

This positioning of interfaces is the key to the patching and switching that enables the substitution of equipment to maintain or restore service and provides the circuit appearances for monitoring and testing.

The equipment racks of a well-designed

(Continued on Page S/27)

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### According to a Stanford Professor

# FCC Must View Product as Integrated Services Pack

**By Edith Holmes**
Of the CW Staff

WASHINGTON, D.C. – The Federal Communications Commission (FCC) must learn to think of the telecommunications product as a package of integrated services for the nonprofessional DP user, Donald A. Dunn, professor of engineering/economic systems at Stanford University, told the commission at a planning conference here recently.

The "service package concept" is essential to the FCC's understanding of computer communications if its commissioners are to decide how to regulate the industry while permitting it to grow, Dunn suggested.

In addition, this notion of integrated services is the way for telecommunications because it makes user learning and system use costs affordable, he told those attending the conference organized by the American Federation of Information Processing Societies (Afips).

Dunn urged his audience to recognize that the structure of computer communications networks suggests a division of provider firms and their services into groups, some of which are already regulated to varying degrees.

These divisions exist independently of either the computer or the communications services involved and, therefore, don't require the FCC to determine which service is DP and which is communications, he said.

### Four Divisions Identified

Dunn identified four divisions: providers of communication lines and providers of complete network services, both of which are regulated as underlying and resale carriers under the FCC; providers of computers and terminal equipment that lies outside the network interface and providers of complete information service packages that may include both communications and DP functions, neither of which are governed at present by the commission.

Competition to provide the complete information service package "is important to the future growth of the industry and to the development of a wide variety of services tailored to user needs," Dunn said.

Noting the present computer communications market encompasses about 500,000 terminals, the Stanford professor sees a potential for 50 million terminals, despite user learning costs and regulatory limitations which, he said, have and will continue to stunt this hybrid industry's growth.

Because the markets for these additional millions of terminals exist chiefly in businesses and homes where noncomputer professionals abound, Dunn favors automated, easy-to-use terminals over the standard variety that require extensive training to operate.

As terminal costs go down – they and not communication line prices are the expensive item from the user viewpoint, Dunn said – the computer communications field will grow, he predicted. However, this expansion will also depend on the availability of integrated telecommunications services, he added.

The core services in the telecommunications package will be message service, text editing, word processing and information retrieval of user files, Dunn said.

If they are really useful, additional specialized services such as news, bibliographic search, financial data and computation aids can be added to the core package, he noted.

### Policies Hinder Growth

Some regulatory policies – like "low rates of return on capital and the assignment of long lives to capital equipment in determining depreciation allowances" – hurt the growth of telecommunications, according to Dunn.

In the short run, these particular policies minimize telephone rates, but they also make it difficult for the telephone companies to finance new communications equipment needed to go with computers and user terminals in a nationwide network, he added.

"These limitations on the growth of the carriers will have an effect on the computer communication industry that is, however, not as great as might be expected because of the relatively low utilization of lines by data users as compared with voice users and the possibility of using the same line for alternate data and voice," Dunn said.

However, the FCC's approach to regulation – dividing the telecommunications industry into its DP and communications components – was of greater concern to Dunn.

Dunn's four-group division of industry providers doesn't worry about the service being offered. Instead, the model concentrates on the notion that the network configuration is independent of the service provided.

Dunn suggested the FCC has already acknowledged the natural boundaries between the providers of communications lines, complete network services, computers and terminal equipment and complete information service packages.

AT&T's telephone service and Satellite Business Systems' integrated services to business firms are examples of firms and services which cut across all these boundaries, he said.

Telenet's packet-switched network and Lockheed's bibliographic search, however, each offer only one level of service: a communication link and an information service package complete with the necessary software, respectively.

Western Union's Telex service, Tymshare's time-shared computing and Arinc's integrated services to the airline industry all provide everything but the communications links, according to Dunn.

### 'Computer Inquiry' Rule

The FCC's "Computer Inquiry" rule that requires DP services to be provided by carriers through separate affiliates limits the growth of carriers, but doesn't

*(Continued on Page S/9)*

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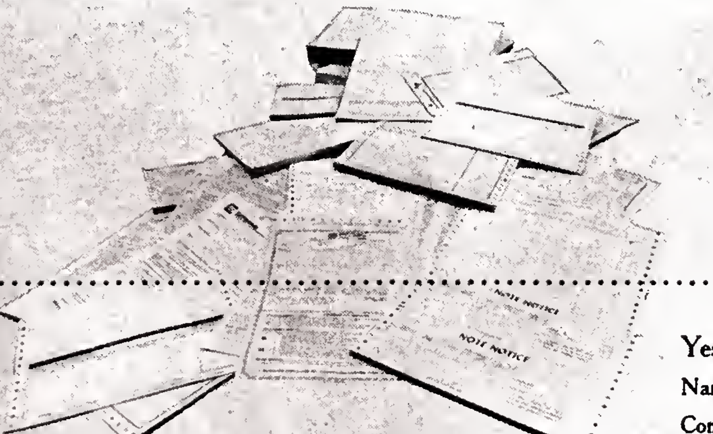

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# Bell Phone Net Remains Mainstay of Communications

*(Continued from Page S/2)*

One could send 100 characters in this time using a 2,000 bit sec Model 201A modem. If you are sending one 80-character record per block, the transmitting efficiency is something on the order of only 44%.

The long turnaround is mostly due to the time required to turn off the echo suppressors, which act to isolate the return path and block signal "leakage" through the hybrids. The echo suppressor for the return path must be turned off to allow signal flow in the other direction.

### Dialing Delays

Yet another drawback for use of the DDD network for data is the call establishment delay. The first component of this is that of dialing. The delay between pickup and getting the dial tone ranges from 100 msec to 500 msec. Thereafter, automatic calling units can "Dial" at the rate of 10 pulse/sec plus a 600 msec pause between digits for a rotary-dial line.

For a tone-dialed line (Touch-Tone), the rate would be 10 digit/sec. A number such as 609-764-0100, then, would take 12.7 sec to pulse dial or 1 sec to tone dial, plus the delay to get the dial tone.

Once the call has been dialed, there is a delay while the switching hierarchy completes the connection. According to Bell, the average delay is about 11 sec for 0-to 180 miles: 16 sec for 180 to 275 miles and 18 sec for 725- to 2,900 miles. Variance for each group is 5- to 7 sec.

In late 1975, AT&T announced a new signaling structure called Common Channel Interoffice Signaling (CCIS). With CCIS the information needed to establish and route calls will be carried on a separate data link from the call circuit. This will allow faster signaling and lead to a reduction in call setup time to about 2 sec, according to AT&T. CCIS is a feature of AT&T's new No. 4 Electronic Switching System (ESS) now in service in Chicago, Kansas City, Jacksonville and Dallas. By 1978, AT&T expects to have 20 such machines in operation.

Finally, the DDD network is usually thought of as being a fountainhead of data errors due to passage of the signal through switching centers and over variable routing. In the most recent study (1970) of switched network data performance, the results showed an order of magnitude improvement over the prior (1959) study.

The 1970 study suggested that some 95% of 10,000-bit blocks would get through error-free at 2,000 bit/sec and 90% at 3,600 bit/sec. Shorter blocks, which are more common, result in better performance. (Nothing should be inferred about performance at 4,800 bit/sec, because such modems utilize a different modulation scheme and may perform comparably or better). An error detection and retransmission scheme can substantially reduce the residual error rate.

Private-line services have traditionally been offered in three principal categories. These are referred to as low-speed or narrowband, medium-speed or voice-grade, and wideband or broadband.

In analog systems, all such channels are derived using frequency division multiplexing (FDM). The carrier begins with "bread-and-butter" voice channels and combines 12 of them, via FDM, into a "group." In turn, five such groups are combined into a supergroup, the equivalent of 60 voice-grade channels.

Finally, 16 supergroups are combined into a line group, representing 960 voice-grade channels. (Such groupings, expressed in bandwidth, comprise wideband offerings.)

Low-speed offerings are obtained by using FDM to divide the voice channel into smaller channels.

There has been a steady trend away from the use of narrowband services for data communications. When one combines line cost with greater capacity, the voice channel is normally more cost-effective. The greater capacity also translates to faster response-time performance, an important factor in many applications.

Private line voice-grade channels are widely used for data communications. They may be arranged for two-point or multipoint service and are generally used at speeds up to 9,600 bit/sec.

In today's commercial practice, multipoint systems are generally constrained to 4,800 bit/sec. This is because of the "training" time needed for high-speed modem signaling.

In multipoint systems, only one remote terminal may have its modem carrier (transmitting signal) on at a time. If two or more were to be on, the mixture would be undecipherable by the computer.

Hence the usual line control procedure is to have the computer invite or poll each remote terminal in turn to transmit. A terminal recognizes its particular poll (address) and turns on its modem carrier. The computer's modem must now adjust itself or "train" to the terminal's carrier.

### RTS/CTS Delay

The remote terminal waits through a fixed delay called the Request-to-Send/Clear-to-Send (RTS/CTS) delay for the computer's modem to train before it begins to send data. For modems at bit rates above 4,800 bit/sec, the effect of the training time on response time has thus far been too great to allow economic multipoint operations.

Codex recently introduced an interesting concept: 9,600 bit/sec from the computer and 4,800 bit/sec from the terminal. In the outbound direction the computer keeps its carrier on constantly, so the RTS/CTS delay is not a problem and the full 9,600 bit/sec can be effectively used.

However, for the most part, present limitations restrict 7,200 bit/sec and 9,600 bit/sec to two-point applications, typically for remote batch, remote job entry or data collection.

One interesting variation on the present ceiling rate of 9,600 bit/sec is the use of two voice channels to achieve 19.2 kbit/sec. Devices are available which will split a 19.2 kbit/sec bit stream into two 9,600 bit/sec streams and feed each into a separate voice channel. At the remote end the device combines the two signals again into the original 19.2 kbit/sec stream.

Communication circuits produce two major characteristic effects on a modem's carrier signal. They attenuate (reduce) the signal amplitude (intensity) as a function of carrier frequency and they delay the signal as a function of the signal frequency.

Conditioning is a process of changing a circuit's characteristics to the point that the attenuation and delay are within values manageable by the modem. These values will be a function of the modem's modulation and demodulation techniques and its operating bit rate.

The Bell System has traditionally pro-

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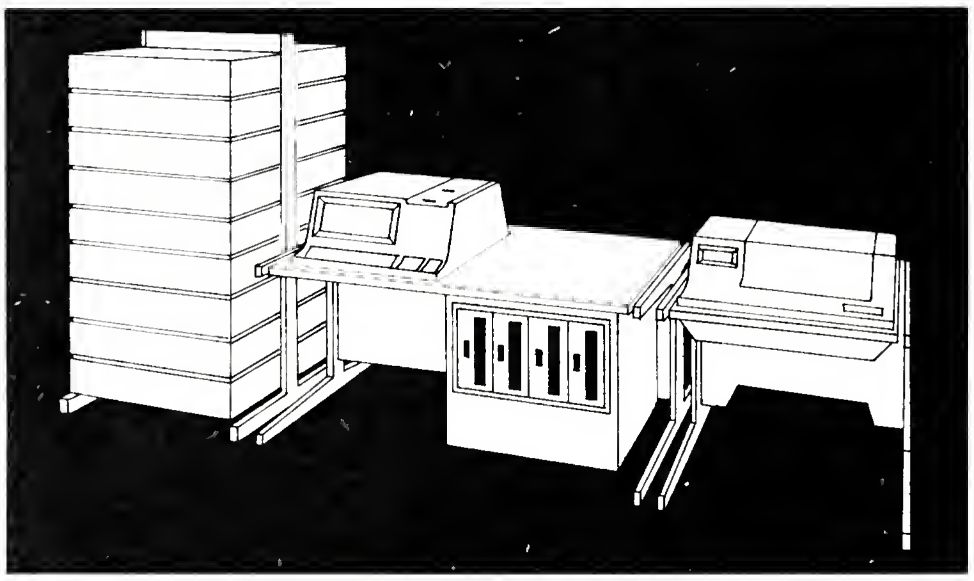

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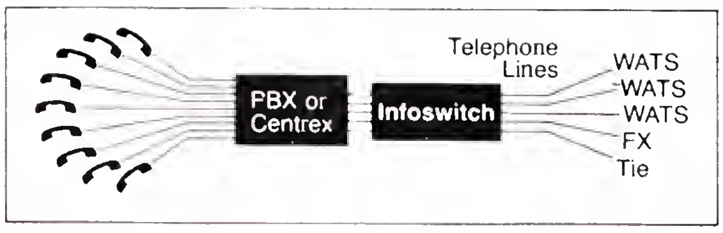

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### Without Rigid Scheduling

# Network Accommodates the Needs of Different Users

**By Jess W. Hall**
Special to Computerworld

By utilizing contemporary technology and software developed in-house, Business Communications Sciences, Inc. (BCS) developed a communication network for Computerized Automotive Reporting Services, Inc. (Cars). Faced with the growing requirements of the automotive industry and the geographically dispersed locations involved with the network, BCS tailored two Honeywell 716 front-end systems (one for backup) to accept accounting, inventory control, leasing, payroll and warranty-type source data.

The communication system has been operational for two and one-half years and presently services 1,000 users. Although the software is accommodating 250 of the ASR 33-type terminals at speeds of 110-, 300- or 1,200 bit/sec, the primary input terminal is a modified version of the Sycor 340.

Operating at communication speeds of 1,200 bit/sec to 4,800 bit/sec, the modified Sycor 340 has performed well in this remote batch environment. Improvements above the ASR 33-type terminals have been a substantial reduction of customer keying errors by utilizing the terminal's self-check digits, document and batch balance capabilities and individual field editing.

Although the majority of the communications are attended, the terminal operates unattended at various times and will accept redial commands from the front end. Various line protocols are supported by both the terminal and the front end; however, the normal protocol is an IBM 2770-type with a few minor modifications.

Having been confronted with both geographically dispersed dealership locations and the rising cost of communication carrier facilities, BCS is utilizing the in-Wats network provided by AT&T. Through coordination with local Bell engineers, both a patch panel and a unique set of inter- and intraband rotary groups of in-Wats numbers are used to further reduce the communication cost. These costs were created by having concentrated areas of dealerships and yet having to provide services for remote and less dense areas with a minimum number of lines.

### Annual Usage Logged

The communication system receives over 1.5 million incoming calls annually. However, since a transmission disposition message and any processed data that is available will be returned to the dealership on the same incoming phone call, the system logs an annual usage in excess of 30,000 hours. Considering that the transmission speeds are generally at 1,200 bit/sec, the number of characters transmitted annually, excluding control characters, exceeds 6.5 billion.

Obviously, security and data integrity are monitored extensively. The front-end software is designed to insure valid user and user-to-data control. This is accomplished through a master file, header/trailer masking and ID matching algorithms.

Data integrity, hardware (both terminal and system) and user fault coordination are monitored by two real-time devices. One of these devices is a Bell Dataspeed 40 located in the customer service department which receives all error code transmissions that are potentially user-type erors. Through this console, customer service representatives are informed of these problems and contact the dealerships to provide available aid.

Secondly, any incoming or outgoing transmission is logged by an on-line printer. This printout contains various data supplied by the transmission itself as well as items such as the physical telephone line number, number of characters, WAKS, NAKS, TTDs, the type of data being transmitted and the user ID. Through the on-line printer, systems operators monitor traffic and can trace any user through the system.

The communication system has provided dealerships with relative control over the system as it pertains to data requirements, without being on a rigid schedule. Yet it affords the Cars computer center the ability to maintain control of a large data base and scheduling of the host system for processing.

*Hall is manager of communication sciences at BCS, Birmingham, Ala.*

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# FCC Must See Product As Service Package

*(Continued from Page S/7)*

have to check the growth of telecommunications because unregulated suppliers can respond to this market, Dunn said.

In addition, he noted, the FCC's regulation of resale carriers – those that provide network services – need not inhibit the growth of computer communications, particularly since resale carriers that do not provide monopoly services won't have to form separate affiliates in order to offer DP.

A resale carrier like Telenet, for example, would not have to form a separate subsidiary to offer DP services over its network.

Further, while resale carriers fall under its jurisdiction, the FCC has, through the "resale-and-sharing" decision, opened the market for network services "to essentially any firm willing to operate as a resale carrier," he said.

The FCC's present regulations on the provision of computers and user terminal equipment as a part of DP services limit the actions of carriers, but they need not limit the growth of telecommunications, according to Dunn.

At the conclusion of his presentation, Dunn reiterated his concern for his group of providers offering complete information service packages. "Pressures are likely to develop soon to regulate providers of information service packages that may offer computer message services to users who obtain network services from resale carriers," he said.

"Such regulation would inhibit the growth of the industry and is not needed to protect the interests of users," he warned.

---

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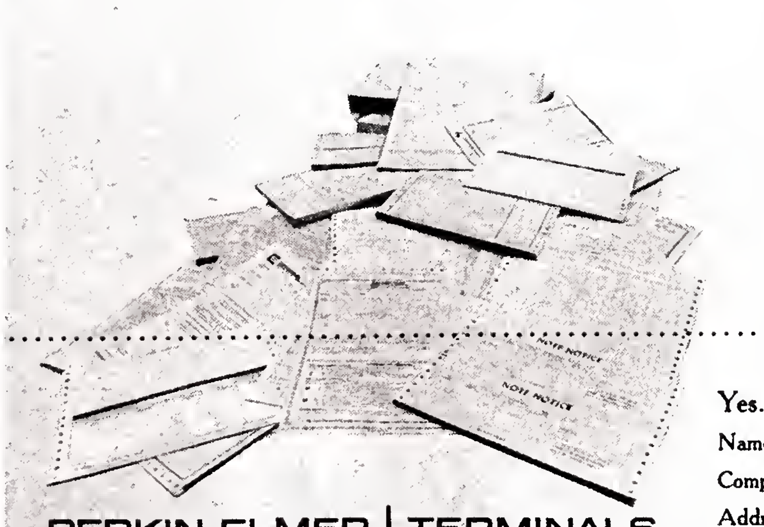

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# Multipoint Net Diagnostics Should Be Reconsidered

By Steve Brauner

Special to Computerworld

Much has been written lately about diagnostic control systems for multipoint networks. After one sifts through buzzwords and vendor nomenclature, a standard set of control capability is left.

There is, however, a unique alternative. Before explaining it, however, let's review standard approaches.

A noninterfering "out-of-band" diagnostic channel, generally FSK, is created to pass commands from a central site to each addressable remote modem drop. A central site operator generally is given the ability to view the status of selected leads of the remote drop EIA interface.

He may also force selected loopbacks and interfering test patterns in order to perform error-rate analysis on specific line segments or hardware. Many systems have additional commands to isolate and turn off streaming modems and to check terminal power and modem power.

### The Missing Element

What is critically missing from these systems is *transmission impairment analysis*. If the operations staff is truly responsible for circuit availability, it must have dynamic measurements relating to receiver level, s/n ratio, p-p phase jitter and amplitude distortion at *every* modem drop.

It is one thing to telemeter the status of a remote modem's signal quality lead. It is infinitely more valuable for an operator to know a circuit's inferior performance is due to excessive phase jitter.

Any high-speed modem, regardless of design implementation (i.e., analog, digital, discrete or LSI), must constantly perform transmission impairment analysis. That is, a modem dynamically compensates for changing power levels, phase jitter, noise and so forth.

If these tracking computations could be made available to the outside world, one would effectively have a tech control center at every modem location.

### Value of Micro

However, it is not easy and sometimes impossible to extract such measurements from analog or digitally designed modems. But a modem which is microprocessor-based would readily have these calculations available in digital word format.

The Microprocessor 4800 from Paradyne uses a microprocessor slice, high-speed multiplier, data memory, coefficient memory, program memory and program address generators. This architecture allows the modem to be changed to any degree desired by simply changing instructions residing in the program memory and constants residing in the coefficient memory.

From the performance point of view, a programmed modem does not differ from any other well-designed implementation. However, the main benefits to the user are significant.

### Most Important

Most important is the continuing on-line signal quality analysis the modem performs as its standard function. By measuring, processing and telemetering parameters such as filter tap weights, eye scatter and phase offset, it is possible to provide on-line indication of signal quality and line characteristics.

This capability can complement and to a great extent supplant conventional line-analyzing equipment. In addition to providing an estimate of jitter and noise, it is possible to indicate the approximate degree of delay and amplitude distortion on a line.

### New Dimension

Each microprocessor-based modem in a multipoint network would constantly be tracking its own degree of jitter, noise and numerous other operating parameters. All of these readings are available in binary digital word format and therefore can be retrieved by a central site facility, adding a new dimension to multipoint network control.

*'A smart modem . . . becomes the basis for automatic management and restoration of multipoint networks.'*

A smart modem then becomes the basis for automated management and restoration of multipoint networks. Conceptually, the find/decide/restore periods associated with the troubleshooting are drastically reduced when the information is retrieved and automatically analyzed against predefined boundaries of parameter status limits.

### Fast Restoration

Restoration of an unavailable circuit was formerly measured in hours and days. It is now possible to restore an outage within seconds or minutes.

Controller's like Paradyne's Analysis I perform automated management and restoration of multipoint networks. The microprocessor-based modem is the prime source of diagnostic intelligence and the controller collects, analyzes and displays this data on a CRT screen.

*Brauner is modem product manager at Paradyne Corp., Largo, Fla.*

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## *Operating in 35 States*

# Xerox Offering Management Services via T/S Net

**By Bob Goodwin**
Special to Computerworld

LOS ANGELES — For the last seven years, Xerox Computer Services has provided business management and financial information services to all sizes of businesses via a time-shared data communications network. All applications are integrated, and business data is always on-line and available for inquiry, update or reporting.

Today this network includes over 75,000 miles of communications lines nationwide with some 1,400 terminals operating in 87 cities in 35 states.

Serving the client base are 11 large-scale host computers at the national data center here. Thirteen satellite computers function as communications concentrators and/or high-speed printer drivers in various major cities.

The data base accessed by network users exceeds 10 billion characters and requires 350 disk drives. Over 100 million print lines are generated every month.

A central data base for a given customer can be accessed by that customer from any number of terminals throughout the U.S.A. A password system assures security of customer data. Terminal density varies from one per customer to over 100 for a large multistate user.

Network customers are primarily manufacturers and wholesale distributors with annual sales ranging from $1 million to $50 million. Local governments and utilities also subscribe to the service.

### Typical Terminal

The typical customer terminal is a Xerox 1340 operating at 10-, 15- or 30 char./sec with the capability of automatic retransmission of parity or block errors and remote diagnostics, as well as forward/-backward printing capability.

The terminal operates in either the block error mode or as a standard Ascii terminal with character parity checking. In the retransmitting mode, keyboard entries are coded as Ascii bit patterns with parity bits.

The Ascii character string is then appended with an LRC character which is included in the transmitted message.

At the receiving point, the message is again subjected to the LRC generation and LRC comparisons are made. The automatic retransmission-on-error feature allows such crucial items as invoices and payroll checks to be prepared at the terminal with an assurance of accuracy.

### FDMs and TDMs

A typical customer terminal in-interfaces to a frequency division multiplexer (FDM) subset operating at 110-, 150- or 300 bit/sec. About 75% of the client terminals are within 25 miles of the satellite computer concentration point where the client accesses the synchronous network, but some are as many as 7,800 miles apart.

Concentration points are in two forms: satellite computer or time division multiplexer (TDM). Computer concentrators provide the dedicated port at branch locations where individual terminal messages are formatted and placed in the synchronous data stream.

TDM concentrators extend the dedicated port from a remote computer location. Concentration points are interconnected through voice-grade private lines suitably conditioned for 9,600 bit/sec transmission; 9,600 bit/sec modems are utilized throughout the synchronous network.

### Three Diagnostic Tests

The network's diagnostic feature provides for three basic tests:

- The basic terminal (keyboard output through the terminal electronics to the RS-232 interface and back through the input side to the terminal output at the printer).
- The FDM unit is "looped back" through the analog side of the unit (testing approximately 95% of the FDM unit electronics) to determine the capability of the terminal to transmit and receive through the FDM unit.
- Testing the error retransmission electronics in conjunction with the remainder of the terminal.

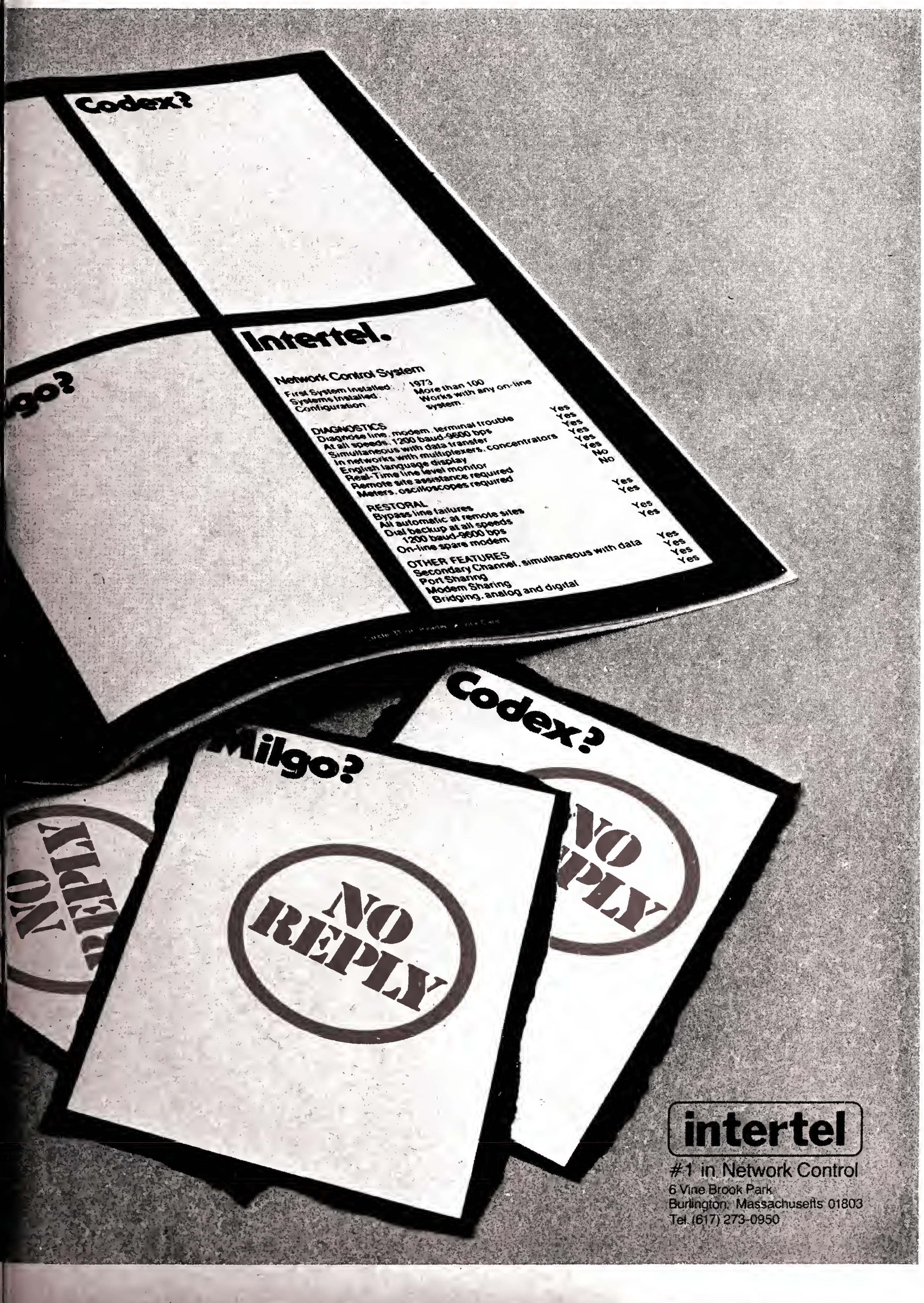
Proceeding through the test sequence allows a high degree of probability that the terminal operator can correctly diagnose a potential terminal problem.

### Pass-Through Transmissions

Messages from remote computer locations may be routed through one or more other computers before that message arrives at its final destination. This is called "pass-through" communications.

Messages typically are routed directly to a host computer. When a primary communications link is out of service, however, pass-through communication permits messages to reach their destination through a more circuitous

(Continued on Page S/26)



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| All automatic at remote sites | Yes |
| Dial backup at all speeds 1200 baud-9600 bps | Yes |
| On-line spare modem | Yes |
| OTHER FEATURES | |
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| Modem Sharing | Yes |
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## *Focusing on Reservations Centers*

# Airline Revamping Entire Data Net for More Efficiency

MIAMI — Most airlines have very comprehensive real-time, on-line interactive systems, complete with a vast array of transmission lines and communications equipment. But instead of adding new lines and terminals to handle the enormous communications workload brought about by increased air travel, data processing and data communications, people at the airlines are discovering new ways to make existing facilities do the job.

Eastern Airlines, based here, is one of the carriers at the forefront of this new networking idea. Under the direction of Robert DeLoach, director of communications, Eastern is currently in the process of revamping its entire data network. In accordance with the new game plan, Eastern officials are concentrating their efforts on putting more communications power in their nine reservations centers across the country and using these centers to feed their System One reservations computer here.

"We're making our system much more efficient," said Steve Barnes, Eastern's manager of data and radio communications. Instead of using several long-haul, low-speed links to our reservations centers, we're using 9,600 bit/sec multiplexed links to the centers and extension links at 2,400 bit/sec to our airport locations. In addition, we have extensive diagnostics and restoral capabilities to handle problems right at central sites rather than dealing with them on a local basis."

### Passenger Processing

The Eastern system handles reservations and passenger processing tasks, such as ticket printing and reservations confirmation for cities served by Eastern in the U.S., Canada, Mexico and the Caribbean. There are 37 leased circuits covering nearly 28,000 miles and 3,500 terminals.

Mainframe equipment includes IBM 370/195s (one on-line and one standby) with an IBM 370/168 on order. For diagnostics and backup, Eastern will use an NCS4000 network control system from Intertel, Inc. of Burlington, Mass., with Intertel MCS1200, MCS2400, MCS4800 and MCS9600 modems, replacing Bell 201, 208 and 209 modems as well as similar Milgo modems.

With the addition of new equipment and the consolidation of existing facilities the new system will now do the same work with considerably fewer lines and at a great savings to the company, officials said.

"We're really consolidating our system in our reservations centers and saving quite a bit of money in the process," said John Steele, technical specialist on Eastern's System One. "Take our Atlanta office, for example. We now have four circuits between Atlanta and Miami and when the new network goes in we'll do the same job with two circuits. We should save thousands of dollars a month nationwide in circuit costs alone.

### 'Some Drawbacks'

"Consolidation does have some drawbacks, however," Steele noted. "Uptime and system availability become much more important, and certain communications links and sites are especially critical to the operation of the entire system. If those segments of the network go down, and Eastern people can't find the problem quickly enough, the entire network may be affected."

Because network integrity is so important, manager Barnes explained, Eastern chose Intertel's NCS4000 to help control the network from the central site at the Doral Computer Center here in Miami. The Intertel system has diagnostics that isolate problems to a specific line modem or data terminal and remote restoral commands that switch in dial backup lines to take care of data traffic while repairs are being made.

Intertel's experience with other airlines, such as Pan Am, American and El Al, and the ability of the Intertel equipment to check the integrity of a communications system as a whole, rather than in individual pieces, also figured heavily in the decision, Barnes said.

Eastern looked at several other vendors, but the company settled on Intertel because the Intertel system can run diagnostics and provide backup outbound from multiplexers and concentrator sites. If trouble develops on any link in the network, central site personnel can find the trouble and restore service with a dial network backup connection in minutes.

"Diagnostics are fine," said Barnes. "But they can't stop at a multiplexer or a remote processor; they've got to go out as far as the network goes."

The Eastern system now has 95% availability. When the new network goes into operation, airline officials expect even better results.

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### *Similar to Packet-Switched Net*

# CSC Infonet Has Virtual Line-Switched Architecture

**By Phil Tenkhoff**
**And Jim Collard**
Special to Computerworld

The Computer Sciences Corp. (CSC) Infonet remote computing network serves more than 100 cities in the U.S., Canada and Europe with approximately 150,000 channel-miles of dedicated circuits. The base for this totally integrated network, which provides toll-free access to any host computer from any point of the network, is a virtual line-switched architecture.

A virtual line-switched network is similar to a packet-switched network, except the path does not vary over the length of the call. In other words, the user establishes a single logical connection path between a network access point and a host computer. However, a "data link redundancy" feature serving a function similar to that of alternative routing is included in the design, whereby the loss of a single transmission link (modem or circuit) does not break the logical connection path.

Another similarity between Infonet's virtual line-switched network and a packet-switched network is the routing function performed by "switcher" remote communications concentrators (RCC). Incoming blocks will, in general, contain multiple message segments destined for different host computers. The communications software in the switcher RCC performs the appropriate switching for these message segments. It was the design and integration of these switchers which facilitated the total integrated network capability.

### Separate Routes

To provide immunity to circuit and modem failures, connections between terminal RCCs and switcher RCCs are via two diversely routed dedicated circuits. In general, each of these circuits operates at 9.6 kbit/sec. A Codex hardware biplexer is used to derive a single, logical 19.2 kbit/sec trunk from the two physical 9.6 kbit/sec circuits.

This concept provides remote concentrator-to-computer center transmission at 19.2 kbit/sec while increasing overall communication network reliability. In the event of a failure of one of the links, all traffic is automatically diverted to the other link.

If network load is not excessive, such a failure would not be perceptible to the terminal users. Under high network load, the terminal RCC software will send delay messages to bulk terminals. This will have the effect of a slight slowing down on those terminals connected to the affected terminal RCC; conversational terminals are not affected. The remainder of the network is totally unaffected.

To further insure independence of the two links, Infonet uses one dedicated voice-grade circuit with 9.6 kbit/sec modems and one Dataphone Digital Service (DDS) circuit operating at 9.6 kbit/sec (in areas where DDS is available).

In addition to providing access to any host computer from any point on the network, the switchers made host computer addition a straightforward process. CSC currently operates 11 Univac 1108 computers under Infonet's proprietary operating system at two computer centers located in Los Angeles and Chicago.

New host computers located within these centers can be integrated into the network within a few hours since there is no dependence upon additional common carrier services. In addition, 1108 host computers located at customer sites can be integrated with the provision of dedicated circuits from the switcher RCCs to the host.

In addition to the increased reliability, the upgrade of trunks to 19.2 kbit/sec provides the network with capacity-related advantages. Using logical 19.2 kbit/sec trunks in lieu of 9.6 kbit/sec trunks reduces by a factor of two the number of trunks terminal RCCs and switcher RCCs must support.

This manifests itself in a savings in RCC core space; this saving permits additional input ports to be configured and allows the network to meet the growing customer demand for higher speed terminals. A typical terminal RCC supports 66 low-speed and 18 high-speed ports.

RCC throughput performance has also been increased with the upgrading to 19.2 kbit/sec trunks. Prior to this upgrade, two 9.6 kbit/sec trunks were used. Since each call was assigned to a specific circuit, lower circuit utilizations were realized in order to provide adequate margin for additional incoming bulk terminal calls.

### Performance Monitoring

As an integral part of providing a highly reliable network, provision must be made for network performance monitoring and fault isolation. With the evolution to the more complex integrated

*(Continued on Page S/26)*

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Computerworld 11-29

## Of Headquarters and Divisions

# Nationwide Net Aids Major Mining Firm's DP Needs

NEW YORK — The Anaconda Co., with 23,000 employees in over 50 locations around the U.S. has data procesing requirements of major proportions. When each of seven major divisions has its information needs added to those of corporate headquarters, the problem is not only data processing but data communications as well.

Anaconda meets its corporate and divisional DP needs through nationwide communications facilities featuring four major in-house host computer sites; a large number of remote terminal systems, including key-to-disk and remote job entry terminals; computer-to-terminal and terminal-to-terminal communications, which allow an optimum mix of local processing and use of host facilities; and innovative use of software.

The current Anaconda communications networks are configured around the following host computers:

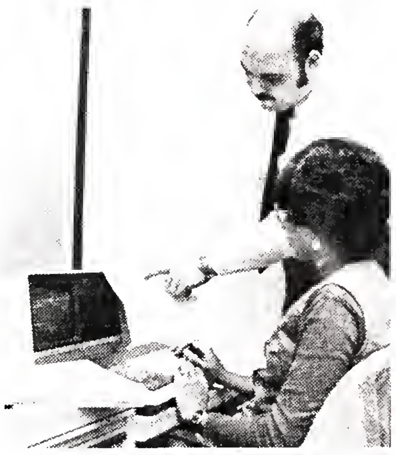
- IBM 370/135 in Chicago, handling the Wire and Cable Division and New York corporate headquarters.
- IBM 360/50 in Louisville, Ky., main office of the Aluminum Division.
- IBM 370/135 in Butte, Mont., divisional headquarters for the Montana Mining Division.
- RCA Spectra 70/45, Waterbury, Conn., headquarters of the Brass Division.
- In addition, the company uses outside time-sharing services for processing financial planning data and on-line computer-based message switching.

Connected to host computers by 4,800 bit/sec dial-up lines are a variety of terminal systems from Data 100 Corp. serving several divisions.The corporate headquarters has a Data 100 Keybatch and a Model 78 remote processing system. The Wire and Cable Division has the following Data 100 terminal systems:

- Batch terminal systems located in Greenwich, Conn.; LaGrange, Ky.; Tarboro, N.C.; Muskegon, Mich.; Marion, Ind.; Harrisonville, Mo.; Eden, N.C.; and Lexington, S.C.
- Keybatch systems located in Sycamore, Ill.;York, Penn.; and Overland Park, Kan.

The headquarters office of the Uranium Division in Denver, Colo., uses a Data 100 remote batch terminal system.

The New York office developed the salaried payroll, savings plan and personnel applications for divisional use and also provides special jobs for individual divisions. Each division maintains the master files for its administrative and financial data at a host computer site, with the remote terminals used for input.



**The addition of a remote terminal system has greatly extended the operation of Anaconda Co.'s New York headquarters.**

Some data is consolidated and forwarded to the New York site, which performs off-line and on-line editing through the terminal systems. The New York terminal system can query its host computer site to determine whether changes in data submitted are valid, compared against master files maintained at the host site.

For most major jobs, edits, updates and corrections are transmitted to the host computer site, where the master files are updated and the reports are generated.

Financial data is transmitted directly from the divisions and corporate headquarters to an outside time-sharing service. The data is then massaged from terminals in New York and the reports printed out there on terminals or a printer. From there, the reports are made available to management.

The New York site also does a number of large remote processing jobs for the corporation. Among these are pension mailings, which require printing 9,000 to 10,000 checks with envelopes and labels, and employee savings plan statements. Such jobs run under RPG and IBM 2780 emulation with master files sent to New York from the host locations.

The Anaconda system permits considerable communications flexibility, according to Joseph P. Ferrugio, manager, corporate systems and processing. For example, the New York remote processing system may communicate directly with other terminals of

*(Continued on Page S/27)*

Sycor introduces the in-between machine.

**More capacity than a stand-alone intelligent terminal. More economy than a mini-computer.**

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Sycor flexibility lets you tailor a Model 410 to meet your specific requirements. Choose from three additional speeds of printers (120, 180 cps and 300 lpm), up to 64k bytes of memory, 5 or 10 million characters of fixed-disk storage and cassette or flexible disk interchange.

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**Get all the particulars.**

To learn more about all the ways the Sycor Model 410 can stretch your data processing dollar and increase the processing power of your remote locations, send in the reply card today. Or call the Sycor office nearest you. You'll find it in the Yellow Pages under "Data Processing Systems."

Sycor puts computer power where the work is.
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### Net Relies on Information Transmission

# Iowa Bank Chain Offering Paperless EFT to Customers

DES MOINES, Iowa — Paperless electronic funds transfer networks are more than just a concept with Brenton Banks, Inc. The bank chain has had an EFT network operating since February which relies almost totally on the transmission of information instead of paper records.

"All of the other approaches I know of retain paper somewhere in the process," according to James Fogt, Brenton's controller. "At the least, they require customers to sign withdrawal or deposit slips or both.

"I'm not speaking here of automated teller machines, which we also incorporate in the system, but of banking terminals in retail establishments. And I'm not talking about savings-and-loan applications that don't have to worry about checks, although even those revert back to paper when they get to the proofing stage," he noted.

"Our EFT is completely paperless, yet it has a built-in audit trail — and that does depend on paper — which our own auditors and those of others say is "excellent."

Known as "Iowa's First Family of Banks," Brenton Banks was organized in 1948 as the state's first resident, multibank holding company. Today its 17 affiliated banks have 42 locations in 27 cities and towns.

Although the Brenton EFT network is designed to run with a 64K NCR Century 101 computer, the holding company elected to install a 96K Model 151 with two tape drives and two disk drawers, the latter capable of storing 29M characters of information. NCR 279 terminals are linked to the CPU by private phone lines.

Fogt said 22 stores were ready for terminal installations, but 16 were selected to launch the network. They are located in Des Moines, Cedar Rapids, Marshalltown, Vinton, Perry, Jefferson, Indianola and Waukee.

In addition, teller terminals were installed in four banks: Fidelity Brenton Bank and Trust Company in Marshalltown, Jefferson State Bank, Warren County Bank and Trust Company in Indianola and Northwest Brenton National Bank. The banks' use of these terminals is largely experimental, Fogt said.

### Transactions Climbing

The first issuance of personal identification numbers (PINs) and plastic cards covered 80% of the potential customers. Based on this number of cards, Fogt said, transactions have shown a steady climb of 20% each month since the beginning.

**The customer enters his four-digit PIN at the supermarket courtesy counter.**

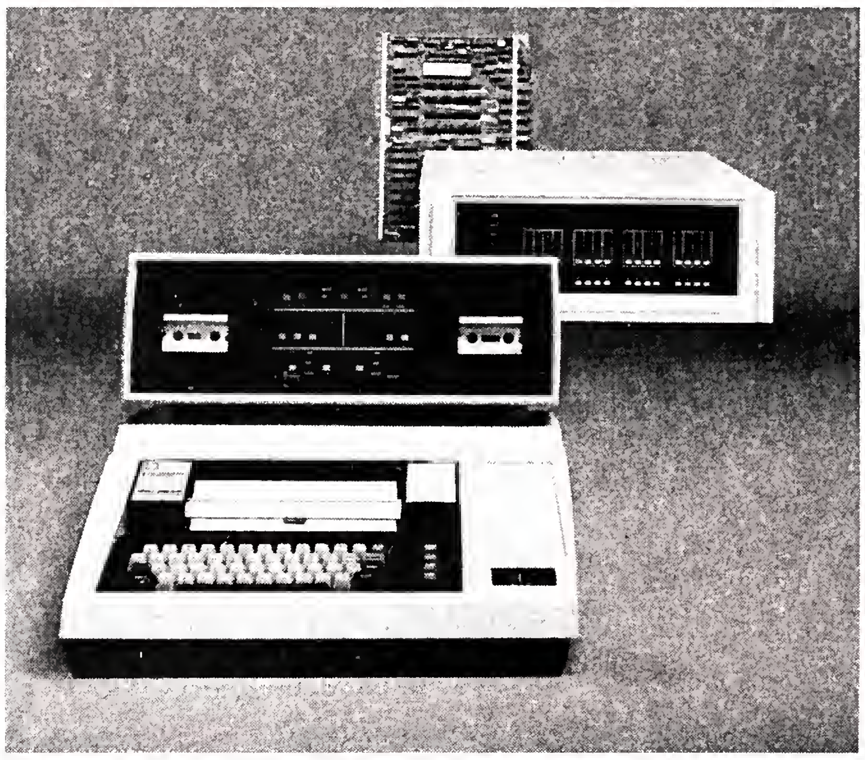
Advertised as "Shop 'n' Teller," the Brenton approach is simple and straightforward for customer and merchant alike, according to Gene Ketchmark, systems manager for the Brenco Automation Center, Inc., which maintains the bank's data base. Ketchmark explained how the system works:

Having given the store employee his card for entry into the terminal, the customer enters his four-digit PIN, using the 10-key pad of the terminal at the supermarket courtesy counter. He then tells the store employee the transaction he desires — withdrawal from or deposit to a checking or savings account. (The system can be adapted for charge cards, too, but this function is not presently being activated.)

The store employee then indexes his operator number, the code for the transaction and its amount. The computer verifies the PIN and account information and approves any transaction, Ketchmark said.

For cash withdrawals, each bank sets its own limitation, he noted, usually $100 in any 24-hour period, with automatic resets for weekends. The bank can vary the amount for individual accounts and can also determine for each account how much of a deposit may be credited for instant clearance. The merchants have discretion, too, for restricting cash disbursements to hold down the amount of cash they must keep on

(Continued on Page S/20)



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A binary data option allows output of 8-bit binary object code onto cassettes after source code assembly.

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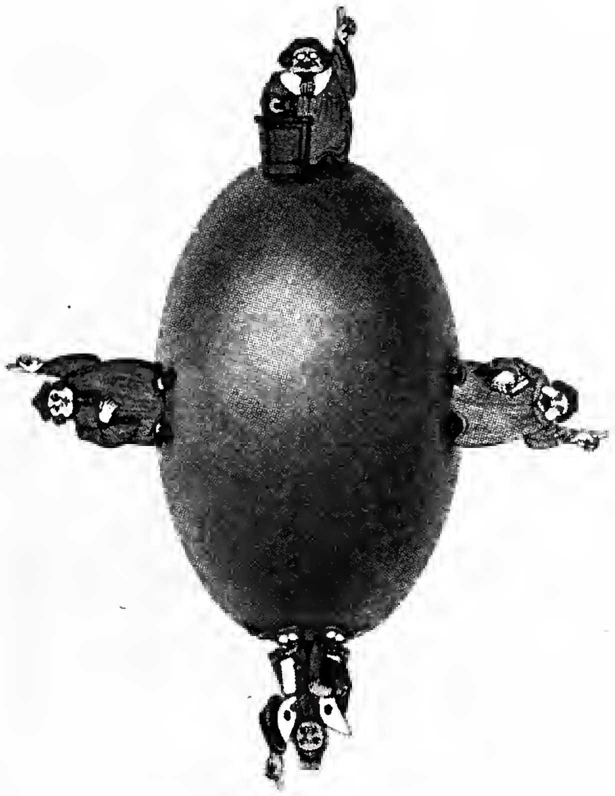

This sequence begins with the replacement of existing IBM 3270 displays, keypunches or remote batch terminals with compatible Four-Phase systems at a few key sites. On these pilot installations, field-proven software speeds the implementation of local transaction processing, local data base management, report generation and communication with the central computer.

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Once the basic distributed processing network is on-line, a stratified network structure (with geographically distributed files and display access at branch, district and regional offices) is slowly evolved to "tune" operations to measured processing and communications volume.

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# Iowa Banks' Paperless EFT Network Relies on Accurate Data Transmission

*(Continued from Page S/18)*

hand

When the transaction is completed, the terminal imprints a customer receipt which records each step and includes an identifying terminal number. This is one portion of the paper audit trail. The other is the terminal's locked-in journal tape, which duplicates the information on the receipt, Ketchmark explained.

At the computer, however, the transaction is recorded on both a magnetic disk pack and magnetic tape. At 6 p.m. each working day, the data on tape is transferred for input to the Brenco Automation Center's main computer where the master records are maintained.

EFT activity is posted first, followed by conventional paperwork. This way, the validity of an EFT withdrawal is ensured, he said. The only item that can be returned is one written on paper. And bank officers have the option of reversing such an item when the scan the computer's exception report the next morning.

"Unlike the situation with conventional paper checks, the merchant can't lose," Ketchmark emphasized. "The bank, via the computer through the terminal, has told him the withdrawal is good and he receives immediate credit in his account."

### Catching Errors

What if there's a malfunction due to either hardware or software failure? Ketchmark readily acknowledged this is possible. He pointed out, in fact, that the debugging of computer programs doesn't prove they're error-free; it merely shows they work. The chance for error still exists.

But the Brenton system guards against such a possibility, however slim, going without detection and correction, he added. The customer has his receipts which he can compare with the entries on his monthly statement. And the merchant has his journal tape for comparison against the computer's daily computation of his debits and credits.

In a similar fashion, electronic notations of transfer for interbank settlements are also protected. If there is a discrepancy, it can be traced back to a specific terminal and a single transaction.

"Nor can a customer sit at home and manufacture bogus receipts," the systems manager continued. "Before any 'correcting' transfers would be authorized, the notation of data, transaction number and time on the receipt would have to agree with those on the terminal tape."

Today, the customers of any participating Brenton Banks' affiliate may use the EFT system because the common data base is maintained by Brenco Automation Center. By March 1, under provisions of a law passed by the Iowa legislature, any customer of any of the state's 660 banks must be able to use any retail terminal, regardless of which bank installed it.

The new law will be put into effect by Iowa Transfer System, Inc., a corporation formed by the state's banks. Dial Financial Corp. of Des Moines was hired to develop the interconnection for the different data bases.

While the use of Brenton's "fingertip banking," may be more convenient than writing and cashing a paper check, development of the system was quite another story. To begin with, Fogt related, the organization went through months of frustration with vendor selection.

"We did not consider it feasible to do the job ourselves. That would have taken two or three years and we wanted to get moving immediately."

Finally Brenton contacted NCR, Fogt said. The company sent a team of systems experts to Des Moines. After determining that NCR's existing packages couldn't be successfully modified because they used paper in the processing, work was begun on writing new programs.

This occurred in May 1975. By July, Brenton executives were

*(Continued on Page S/26)*

**The store employee indexes her operator number, the code for the transaction and its amount.**

KEEP IT SIMPLE . . .

Today, the economics of distributing computer power to the source of data is well accepted. But the key to success is simple-to-use software . . . so your branch office clerk can really use it — not *just operate it!* ENTREX excels in making complex computer functions *seem* easy. We have done it for years. We use the power of the computer to help the programmer and the operator.

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SERIES 600/20

A NEW Remote

## After Its Acceptance

# Where Can Retailers Take POS for Guaranteed Rewards?

**By Dan A. Barnes**
Special to Computerworld

Now that the initial benefits of point-of-sale (POS) terminals and networks are accepted by a majority of the retail community, where does the retailer go from here?

There is one certainty — he won't go anywhere until assured of a good return on any further investment.

For example, when a retailer who's been capturing data on punched paper tape and using an on-line credit authorization system rcplaces this system with an electronic POS system, he is actually duplicating some of the capability and benefits he already enjoys.

### Additional Payoff

Investment in any new system must offer an additional payoff. This could be better customer service, faster and more accurate data capture and processing or reduction in operating expenses. Or it could be regarded as increased flexibility to automate and integrate other areas of retail operations and applications made possible by POS.

The anticipated length of life of any new system is particularly important in today's uncertain, yet rapidly evolving technological, economic and regulatory environment. Generally, a retailer expects a two- to five-year tangible return on investment, in combination with an eight- to 12-year useful systems life. Thus, the trade-offs between prior system investment versus new are very important.

Retailers who have installed POS systems in the past five years are likely to keep their initial equipment in place for another three years. Any investment in new systems will probably happen one step at a time, on an application basis, as well as by store location. So operating and communications compatibility with existing systems, plus flexibility to continue working and be updated for the next eight to 12 years are key considerations.

The retailer's biggest consideration for future POS systems will be in making information more useful to everyone in the organization.

More useful information is information that helps improve profits. An historical example is a fashion-oriented women's ready-to-wear chain with stores in over 70 cities. Its central office exercised control over buying and inventory. Sales reports by SKU members were assmbled by recapping written sales slips at each store and then sent by mail to the central office every Saturday night.

*'The POS system and equipment users are looking to today must be very adaptable to meet growing and changing requirements.'*

Three experienced buyers placed all merchandise orders. Over the years, they became experts at extrapolating sales information from particular stores. They knew if a specific new item was selling fast in a certain store in one city, chances were it would also sell at similar stores in other cities. Orders were placed immediately for these other stores while manufacturers might still have available stocks.

That use of information was the key to profits for this retailer. But retirement of one buyer, escalating labor costs of the system and slower mail service eventually forced him to use electronic data collection at each store, plus data communications and home office computers to maintain his "competitive edge."

This example shows how we should strive to extend the usefulness of electronically generated information today. How far have we come?

### How Far Have We Come?

Early computer technology allowed the retailer to automate his general accounting applications, enabling him to receive the reports he needed for improved financial control.

Batch-oriented computer processing was then applied to the control of inventory. The addition of punched paper tape to cash registers in 1957 helped the retailer improve his merchandising mix — particularly in expanding department/class sales information and staple stock replenishment applications.

Then, data communications of the late 1960s greatly accelerated transmission of information to the central computer. It also reduced paper flow and labor content generated by transactions and provided more timely operating information.

Today's technology has built a new platform from which retailers can generate more useful informa-

(Continued on Page S/29)

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Our new 600 Series family is not only simple, it has all of the processing power you want to distribute:

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# New Communications Standards Being Developed

(Continued from Page S/2)

regarding the way in which these commands and responses are to be used for various applications involving different terminal and link configurations. Consensus is slow to achieve because of the many members who must all be satisfied with the proposed standard.

IBM, because of its ability to act unilaterally in product announcements, has announced its own Synchronous Data Link Control (SDLC) procedure, which is quite similar to HDLC, but not fully compatible at present. Some other vendors such as Burroughs have announced they will be compatible with SDLC, ADCCP and HDLC. Digital Equipment Corp., on the other hand, has continued to pursue its own link control procedure (DDCMP) which is quite different from any of the proposed standards.

As strong vendor participation continues in the final development of HDLC, it seems likely that a standard will eventually emerge that will be implemented by most of the major vendors.

### Packet Switching

One of the most dramatic standards developments in the last few years was the adoption of Recommendation X.25 by the CCITT at its quadrennial plenary assembly this past September. Recommendation X.25 is a standard for interfacing host computers to public packet-switching networks. It includes both X.21 and HDLC in the appropriate portion of the standard and adds a set of packet formats and commands and responses for setting up "virtual calls" and transferring data through the network.

Agreement on such a worldwide standard seemed quite remote only a few years ago, and it was not until the major packet-switching carriers around the world got together privately that a consensus emerged. The standard has been criticized by some as lacking in certain features — notably the standard does not cater to the "datagram" service — but these deficiencies are already being addressed by proposals to add to the standard.

The key point to note about X.25 is that a workable solution has been adopted which averts the situation of multiple incompatible interfaces being implemented by carriers in each country. Thus, it will be possible for computer manufacturers and software houses to build and support only one interface for packet switching.

The data communications area is a very dynamic one at present and standards will continue to evolve to keep pace with the state of the art. Significant developments to look for over the next few years are the completion and large-scale implementation of work already begun, such as HDLC; additions and modifications to recently adopted standards, such as X.25; and the initiation of new work in areas not currently addressed, such as end-to-end protocols between host computers.

The lack of widespread user participation in the development of data communications standards (with the major exception of the Federal government) is unlikely to change, although some users may finally begin to recognize their interest in these issues. User participation is certainly welcome on all standards committees.

*Cotton is a computer specialist with the Institute for Computer Science and Technology at the National Bureau of Standards.*

# Value-Added Net Serves Many CPUs

(Continued from Page S/3)

host on any schedule. For instance, if a customer normally runs accounting from a terminal at three o'clock in the morning, this can be automated.

In 1977, we will be deploying Tymnet II. In the current network, if a line or node goes out, the circuits over that line are broken and the user has to log in again. In the new network, the circuits will be rebuilt with no loss of data or inconvenience to the user.

Circuit routing will be more sophisticated. For instance, given a choice between a 50 kbit/sec satellite line and a 4,800 bit/sec land line, the supervisor will route a remote job entry user over the satellite to get the bandwidth. A low-speed interactive user will get the land line to avoid the satellite delay.

A message-switching service of very high quality and reliability will be provided. In addition to the features provided by conventional message-switch services, this will provide low-cost on-line editing, message transfer to host computers and interface to all terminal types supported by Tymnet.

Touch Tone input with voice answer-back will appear sometime during 1977. We will be compatible with the Transaction series of telephones except for the referral mechanism.

In Tymnet I, the software for a node has to be loaded by someone on site, typically from a magnetic tape cassette. A bug in this software can bring the node down. In Tymnet II, software is loaded remotely. Undebugged software can run in partitions without endangering the node. Debugging can be done remotely. This is important for providing quick response to customer interfaces.

Finally, the variety of terminals and line disciplines will continue to expand. We intend to continue our philosophy of supporting these things in the network and shield the host computer from their incompatabilities as much as possible.

*Tymes is general group manager, network services and products at Tymshare, Cupertino, Calif.*

# Phone Net Mainstay Of Communications

(Continued from Page S/8)

vided three common types of conditioning (types C1, C2 and C4) giving successively higher quality circuits at increasing monthly costs. There are other C grades of conditioning for specialized or military applications.

Bell recently introduced a type D1 conditioning for two-point, 9,600 bit/sec service. It should not be thought of as being better than C4. Type D1 conditioning is accomplished primarily by facility selection rather than adding equalizers, and it also concentrates on other parameters more pertinent to 9,600 bit/sec transmission than attenuation and delay.

*Reagan is managing editor of Datapro Communications Group. This article was taken from reports published by Datapro Research Corp.; Delran, N.J.*

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# Configuring Terminal Networks Requires Maximum Planning

(Continued from Page S/4)

should be placed.

- Two-wire or four-wire facility.

Although the service offerings and charges vary widely, the technical considerations are generally similar. The AT&T Tariff 260 covers multidrop, leased, interstate networks. Although intended to define the characteristics of interstate services, 260 is generally adhered to by local telephone operating companies. The tariff defines the characteristics of point-to-point and multidrop two-wire and four-wire leased-line facilities.

Although Tariff 260 is of some assistance in defining a standard that is used from state to state, most multidrop leased facilities have evolved over the years in their technical characteristics. As an example, it is customary in four-wire facilities to dedicate one pair to transmit and one pair to receive. There is no standard as it relates to which pair is which when the drop is installed.

It is a general consideration in all states that non-telephone company terminal equipment must have certain characteristics in order to function with the rest of the telephone machinery.

The availability of multidrop service in a particular locale is generally a function of the bridging equipment available in the telephone central office. Although to a computer or concentrator it may really appear that a circuit has 20 or 30 terminals dropped off along the way, electrically each terminal is connected point to point to a bridge in a particular central office. From that bridge all the signals are combined into one circuit that is terminated again in a point-to-point fashion at the user's computer location.

The actual copper wire is generally not a factor since most phone companies as they install new cables and new underground facilities have extra cable pairs in anticipation of expansion. If the telephone company does not have bridging equipment in the central office, off-premises bridges may be used that are either purchased outright or rented from the telephone company.

These bridges may be used to extend the capabilities of the local central office or in lieu of multiple drops such as in a large discount store. With these bridges the user may request the telephone company to install one drop and then connect a terminal at each checkout lane to that drop via the bridge.

In addition to bridges, concentrators and controllers can be employed to reduce communications costs and provide efficient terminal control. Concentrators may be of the hard-wired variety and do nothing more than concentrate several low-speed lines into one higher speed line.

Another type of concentrator provides intelligence in the form of polling, message formatting and network control. The proper choice of function and geographic placement of concentrators can produce enhanced performance and lower network operating costs.

### Mixed Modems

Until very recently, most telephone operating companies would not allow the intermixture of Bell and non-Bell modems on a leased telephone circuit. However, new tariffs are being considered which allow intermixture of Bell and non-Bell modems.

Although the telephone companies offer modems for most traffic and signaling rates, for a large network the user should certainly investigate capabilities available in non-Bell equipment. A number of terminal devices, especially those intended for location at the point of sale, have modems integrated into the terminal.

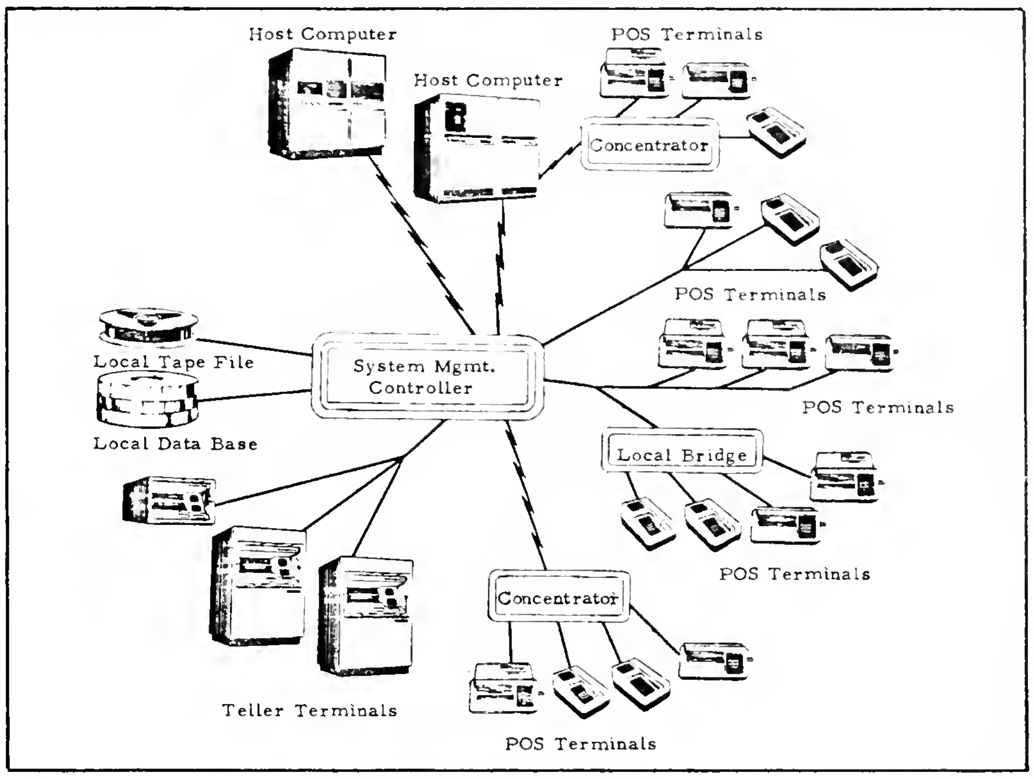
In choosing modems there are several characteristics which tend to vary from modem type to modem type and manufacturer to manufacturer. Some of these characteristics are receiver sensitivity, clear to send time and carrier detect time.

Modems may be connected to terminals or computers via an industry standard EIA RS-232 plug. Within the EIA standard, the definition of the signals at each of the 25 pins in that plug is recorded. As with any standard, these are "almost universally" accepted uses for the 25 pins in the connector.

The local loop portion of the network is sometimes given through only at the later stages of system development. There are several considerations that must be made in defining multidrop configurations, especially for networks of any size.

Although the mileage charge and the drop charge for a given state may not be a factor which can be varied, there are a number of alternatives as to how users purchase those

(Continued on Page S/24)



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## Planning Needed Now

# Users, Not Vendors, Must Shoulder Reliability Burden

By M.W. Green
Special to Computerworld

Data transmission capability is still largely dependent on the basic facility linking the originating data point to the terminating data point. In the pioneer days, these were telegraph lines and human relay stations. Now they are high-grade telephone circuits and even satellite links with enough electronic gear in between to scare Jules Verne.

The point is that the actual data link is and will be the critical portion of a data communications network. Its presence or absence is the difference between being operational and not being operational.

As more and more vendors steadily develop data transmission equipment and integrate their equipment with other manufacturers' equipment, diagnostics of network failures become less and less promising. Clearly, fault isolation in a multivendor data communications environment is an industrywide problem. It is this area of concern to which we must address ourselves.

It is evident that we can no longer place the responsibility of network diagnostics in the hands of multiple vendors. If we are to continue expanding our networks at the current pace, a large portion of the design must be emphasized in central site network diagnostics and control.

The ability to rapidly pinpoint inoperative equipment in the network, so corrective action can be initiated or backup procedures executed, will mark the difference between a fully operational network and one that is only partially available. Highly specialized devices such as network diagnostic centers and intelligent modems must be integrated into the network to provide the required capability.

Early planning is the key. Not all data communications networks require the same degree of reliability. The first step in planning a network is determining the amount of reliability required.

> *'It is evident that we can no longer place the responsibility of network diagnostics in the hands of multiple vendors.'*

If it is absolutely necessary that a line or group of lines be 100% operational, then obviously some form of backup is required. This can be accomplished by building in network redundancy through the use of backup lines, modems, multiplexers, terminals, etc. Needless to say, this can be a very expensive proposition.

An alternative approach is the use of limited redundancy in conjunction with central site diagnostics and remote intelligent modems. These systems can actually reduce network downtime by reducing the amount of time consumed in diagnosing problems. In many cases, it is possible to detect a potential problem and effect repairs or execute backup procedures before a downtime occurs.

These systems accomplish this feat by allowing a single individual at the central computer site to perform a multitude of network level diagnostic tests without remote site operator intervention. These tests include level measurement, analog and digital loop-back tests, bit error tests and protocol monitoring.

### Problem Isolated

A problem can be isolated to a malfunctional unit virtually in seconds and accurate information can then be passed to the vendor responsible for repairs. This approach eliminates the "finger pointing" generally associated with multivendor installations.

Obviously one cannot simply add this capability to an already existing network.The compatibility requirements of the network diagnostics center and remote equipment dictate that the capability be designed into the network at the beginning. Generally it is not necessary to install the central site diagnostic equipment in the initial installation phase; however, remote site equipment must be selected to allow operational compatibility with central site diagnostic equipment in the future.

### Equipment Expensive

While most of the equipment required to perform network level diagnostics is expensive, planned integration in an on-line network can prove to be one of the most cost-effective measures available in ensuring the reliability of the data communications network.

We are currently facing the onset of a new data communications era. With the advent of electronic funds transfer, more people will be affected by computer-based on-line data communications netwoks than ever before. All indications clearly point out that with the massive volumes of data and distribution of I/O equipment, network downtime will rank high as one of the most critical factors in the success or failure of this new industry. Now is the time for planning.

*Green is director of communications with Financial Data Systems, Inc., St. Louis, Mo.*

# Configurations Need Maximum Planning

(Continued from Page S/23)

facilities from the telephone company. A clarification of Tariff 260 indicates, for example, that if any portion of a network is interstate, the entire network must be considered interstate. This interpretation not only may result in lower overall network costs because of the FCC control of interstate tariffs, but may also provide better service since that allows the user access to AT&T communications experts and engineers.

Most vendors of terminal and computer equipment have a great deal of expertise in the area of equipment as well as dealing with the local telephone company. They generally can provide the user the best immediate information on how to begin network planning.

*Looney is manager of systems and software development for terminal systems with Addressograph-Multigraph Corp.*

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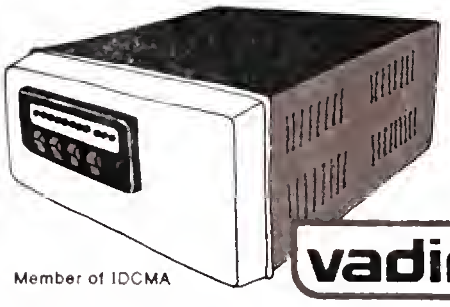

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CIRCULATION DEPARTMENT

# Shipper Planning Data Links From Europe to New York

NEW YORK — A distributed data base system utilizing small business computers will use leased lines to link operations centers in four European port cities with the home office of U.S. Lines here early next year.

Two Wang 2200 computers with 16K words of memory each, a 10M-byte disk drive and a 165 char./sec printer have been installed at U.S. Lines' offices in Hamburg, Germany; Rotterdam, The Netherlands; Liverpool, England; and Le Havre, France.

In each location, the two computers have been multiplexed to the disk and are currently being used in a stand-alone mode. The systems, including CRT displays and keyboards, capture and edit data and provide a variety of reports for local managers relating to vessel manifests, customer invoices and accounts receivable.

By February, the Wang systems in Hamburg, Liverpool and Le Havre will begin transmitting data on both invoices and vessel manifests to the system in Rotterdam, according to Frank Keahon, manager of systems development for the shipping concern.

U.S. Lines has ordered microprocessor-based communications controllers from Wang for those transmissions, which will be made over dial-up lines approximately twice each week, Keahon said.

Data will be stored on disk in Rotterdam and forwarded via leased line to U.S. Lines' IBM 370/135 here two or three times each week, Keahon explained.

The link between the Wang and the IBM computers will utilize 2,400 bit/sec LSI-24 modems from ICC/Milgo and will employ standard IBM 2780 bisynchronous protocol running under Power/VS communications software.

### No Keypunched Mail

Thousands of documents which are currently mailed from Europe to New York will be edited on site and transmitted directly to the home office mainframe through the 2200 system, according to Keahon. At present, the data received by mail must be keypunched in New York, but full implementation of the Wang system will eliminate that requirement, Keahon said.

"Besides eliminating redundant keyboarding, implementation of the Wang system will enable our 370 to generate outbound reports that will be useful to our managers in Europe — container lists, for example," he added.

"It will also enable us to automate preparation of our European manifests, which run as long as 400 pages and involve as many as half a million characters of data. Manifests and invoices are the two most important documents in the shipping industry," he said.

Howard Mah, project leader for the distributed data base system in Europe, explained "it takes a lot of data to prepare invoices and manifests, but once that information is captured we can make a lot of use of it.

"Right now, we are capturing and editing on the Wang computers about 60% of that data. By the time the data link between Rotterdam and New York is in operation, we will be capturing all of it," Mah predicted.

### Some Lessons Learned

Keahon noted some of the lessons learned in developing U.S. Lines' distributed system in the U.S. — IBM 3270 terminals installed in 10 locations and running under IBM's Customer Information Control System (CICS) — were applied to the system in Europe.

"The costs of installing a similar system in Europe were prohibitive since dedicated lines to each operating center would have been required," he said.

"What we wanted was enough intelligence to provide a usable data base at each location in Europe. To provide that data base capability, we applied some large systems concepts to small computers," Mah added.

Such editing features as check digits, table lookups with insertion and universal update have been built into the system to enhance both speed and accuracy.

In preparation of a customer invoice, for example, an operator can key in a customer number. The system will automatically validate that number by checking it against a stored table and respond by displaying or printing the customer's name and address.

The customer master file stored at each location in Europe contains complete information on customers using that port or any port served by that center.

In addition, a vessel voyage master file stored on disk at each location contains vessel and voyage numbers, rates of exchange and sail dates and arrival dates.

"From the information stored in those local data bases, each of our operating centers can produce a variety of reports," Mah explained, "such as customer statements, dunning notices and the statements needed to pay our agents' commissions.

"The system also produces reports for local managers on accounts receivable or aging listings in sequence by customer number, vessel voyage number and invoice number.

"Some of those reports weren't prepared at all before we installed the computers and others which were prepared can be prepared in much less time now. Aging, for example, took approximately 20 man-days in one port before the computers were installed," he said.

> *'We wanted enough intelligence to provide a usable data base at each location in Europe . . . We applied some large systems concepts to small computers.'*

And while the volume of receivables at each port has increased by about 50%, those receivables have not stretched out. "That is true, in part, because of improved response from our customers," Mah said.

"When we send out an invoice now, our customers know and we know the invoice is correct. Invoices are also going out more promptly.

"The system provides each of our centers with vessel voyage checklists which reconcile what is invoiced against what is manifested. These checklists are now completed before the ship leaves port."

### Selection Reasons

Keahon said U.S. Lines selected Wang over other small computer and small business computer systems suppliers because of cost and because Wang could provide the worldwide service required.

He estimated the value of Wang equipment currently installed in the four operat-

(Continued on Page S/29)

CLIP AND RETURN FOR FAST RESPONSE

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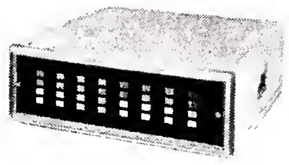

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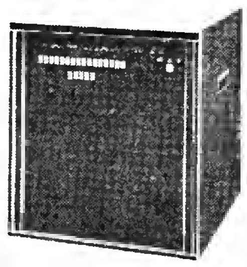

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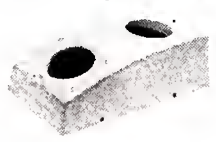

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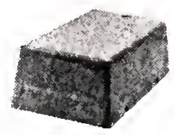

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# CSC Infonet Has Virtual Line-Switched Architecture

*(Continued from Page S/14)*

network, additional hardware and software performance and fault isolation features were required.

Hardware devices were designed and implemented to monitor high-speed trunk (terminal RCC to switcher RCC) performance. These devices provide the communication technical support engineer with an immediate assessment of any line, modem or RCC that is inoperative. In addition, the status of all host computers in all centers is constantly displayed.

All of this has been incorporated into the existing communication network without increased common carrier facilities. A small part of the available dedicated line transmission bandwidth is used to transmit operational status information.

An RCC power detection and controller provides a special indication if the remote terminal RCC has lost power. A recent engineering change has provided the technical support engineer in a computer center with the ability to power up a remotely located terminal RCC after a power failure.

Previously, a manual power-up at the terminal RCC was required. Since momentary power losses account for about one-half of all RCC hardware-related outages, this change has further enhanced network reliability.

A major software-driven isolation and performance monitoring tool was developed and is known as the Engineering Logger. This logger consists of software controlled by Infonet's proprietary operating system. It permits the technical support engineers to monitor principal parameters of network activity such as:

- High-speed trunk loading.
- Error retransmission frequency between RCCs and between RCCs and hosts.
- RCC utilization (processor and memory buffers).
- Host computer load status.
- Status of all terminal-to-switcher trunks.
- Host and RCC recoveries.
- High-speed trunk events (standbys, recoveries, etc.)

The integrated network, with the combination of the improvements discussed previously, has resulted in a network reliability of 99.8%, as measured from terminal RCC to host computer.

*Tenkhoff is director of system development and Collard is manager of network engineering with CSC, El Segundo, Calif.*

## Banks Offer Paperless EFT

*(Continued from Page S/20)*

talking to supermarkets, asking them for guidance and seeking to sell them on a system that didn't yet exist. Then over the next three months, an NCR van was used to show affiliate banks the hardware that would be used.

"When we approached the supermarkets," Fogt recalled, "our thinking was that we know banking and that they would help us with understanding the needs of retailers. Very quickly we learned that grocery stores cash more checks than banks do and that a returned check costs them $1 to $2 in paperwork.

"This meant they were very receptive to something that would take the risk out of check cashing. We pushed two other major benefits: the customer convenience helps boost store traffic and the transactions are handled much faster.

"For the banks, of course, a new service such as EFT is always a competitive edge, at least for a while. But the biggest plus is the elimination of paperwork. Conventional checks alone cost 15 cents to 22 cents each to process."

As a part of its EFT network, Brenton affiliate banks have installed six on-line NCR 770 automatic teller machines in Adel, Grinnell, Davenport and Des Moines, including one at the capital city's municipal airport. While he thinks both the "anytime teller" machines and the retail point-of-sale terminals are needed, Fogt pointed out "the two really serve different needs and neither is as expensive as the quarter to half million dollars it costs to put up a new office. Nor are they as permanent as bricks and mortar. If a location doesn't work out, we can move the machine to another site."

Other organizations have shown an interest in Brenton Banks' package. The software includes a range of capabilities from customer files through operating manuals and is being sold to other banks.

## Xerox Offers Services Via Time-Shared Net

*(Continued from Page S/11)*

path. The host processors themselves are also able to pass messages to each other in those circumstances where direct communications is not possible from the remote computer location.

The entire design of the terminal, communication network support and operating system software has been with the objective of trouble-free operation of the time-sharing service regardless of the performance of the communication lines.

*Goodwin is manager of marketing administration at Xerox Computer Services.*

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*Dick Whalen, Director, Data Processing, Kawasaki Motors Corp., U.S.A., Santa Ana, California.*

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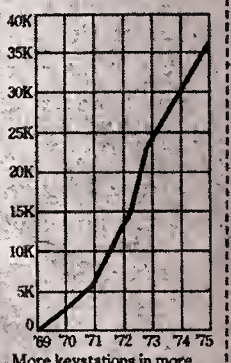

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## For Headquarters and Divisions

# Nationwide Network Aids DP Needs of Mining Firm

*(Continued from Page S/17)*

various vendors around the country, without going through any host computer. Because the New York site must communicate with a variety of devices, the system there must emulate several different types of remote terminals, including the CDC 200 User terminal and the IBM 2780.

This capability is a major reason why Anaconda chose the Data 100 Model 78 remote processing system for its New York office, according to Ferrugio. "We visited a Data 100 customer with similar interface requirements and they were extremely happy with the performance of the vendor and the equipment," he stated. "Besides, the system was cost-competitive."

The Model 78 was installed in early 1973, replacing a Honeywell G-115. The Keybatch system was added in 1976 to replace card data entry equipment.

### Variety of Languages

Cobol is the principal programming language for Anaconda's major applications. However, the New York site has exploited RPG capabilities for a variety of special applications.

Ferrugio said to his knowledge Anaconda is one of the largest users of RPG software among all Data 100 customers: The number of individual programs developed for special reports totals nearly 300.

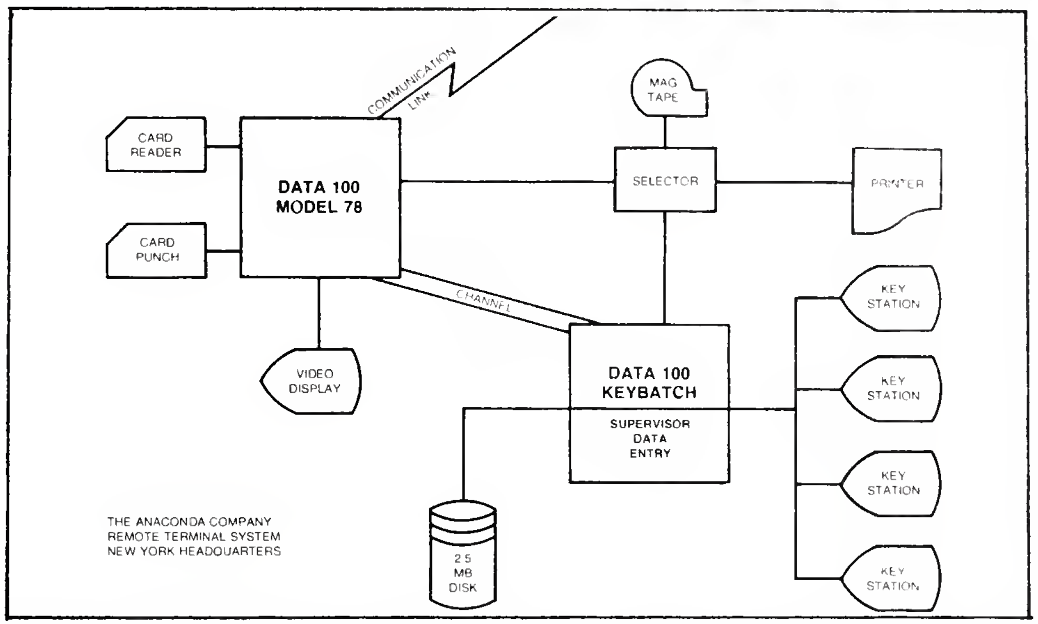
One useful example of RPG software is a telecommunications analysis system developed to help the company make better use of telephone facilities. This system provides analyses of telephone company-provided toll and Wats records, including calling by type (direct dialed, collect, credit card), point-to-point calling and calling by Wats band.

An interesting example is the Inwats analysis. This report is used to determine if a location should provide Inwats service for other Anaconda locations to call it. This report takes advantage of many of the capabilities in RPG for producing a very clear and literate report.

### Program Development

The recent frequent communication tariff changes led to the development of a series of RPG programs to analyze those changes so their impact on the company could be predicted. Current rates can be compared with those of previous years for Wats, direct distance dialing, operator-handled and person-to-person calls. Additional programs analyze current rates so they can be effectively applied.

Although most reports generated under Anaconda's personnel system are produced by Cobol or Mark IV programs, RPG has also been used for several other specific cases. The annual budget presentation for upper management is accomplished wholly through the use of RPG. A number of local processing utility programs are written in RPG and reports which analyze system utilization have proven very useful to DP management.



**The two systems share all peripheral devices, creating an integrated system with remote batch/data entry capabilities.**

RPG is used for most of the data editing and verification, as well as companywide inventory lists for DP and telecommunications equipment. A master list of systems and applications for the entire corporation is also maintained with RPG.

### Outstanding Feature

An outstanding feature of the Data 100 system for Anaconda has been its reliability, Ferrugio stated. During the three years the Data 100 system has been in operation in the New York office the total downtime has been no more than three days. This includes time consumed in shifting the equipment twice between locations, he said.

"What's quite amazing," he added, "is that no matter what we do with the equipment, we've never had a problem in getting it up and running. As soon as the various equipment arrived from Minneapolis and was hooked up it worked the first time."

The addition of the Keybatch to the Model 78 remote processing system at the New York office has greatly extended the operation of the New York site. The Keybatch data entry feature has replaced keypunching, thereby saving time and reducing errors in the editing process, Ferrugio noted.

The two systems share all peripheral devices, creating an integrated system with remote batch/data entry capabilities. Ferrugio said this integrated system has the capacity to handle additional jobs for the corporation and the divisions.

# Control Facilities Extend Net Efficiency

*(Continued from Page S/6)*

technical control facility include the full complement of test equipment required to carry out all of the monitoring and test functions associated with preventive maintenance test routines and troubleshooting.

### Principle Adhrence a Must

The arrangement of the patching jackfields, switching equipment and test equipment must adhere to basic human engineering principles.

Dealing with circuit problems during peak traffic periods taxes the best of controllers, so the technical control facility must display circuit information clearly, permit the controller to function smoothly in patching and switching operations and introduce no peculiar problems of its own.

The result: increased network efficiency. Downtime is reduced by keeping failure rates low and repair times short. DP management time is maximized by giving the user his data communications money's worth, eliminating the frustrating hours — and dollars — pointing fingers and losing information.

*Adams is vice-president of marketing at Spectron Corp. in Moorestown, N.J.*

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# Net Design Technology Key to Coping With Alternatives

*(Continued from Page S/4)*

network are optimized by testing various combinations of links among a few selected nodes.

The methods usually begin with a network satisfying all constraints, either selected by a human or generated by computer design program. Exchange methods are then applied until a new network which both satisfies all constraints and has lower cost is found.

This process is repeated until cost can no longer be lowered. The resulting network is said to be "locally optimal."

The process is then repeated using either a new starting network, a different class of exchange methods or the same methods in a different order.

Exchange methods have been applied to the design of both centralized and distributed communication networks. In the design of a centralized network, the problem is to produce a low-cost network connecting the terminals on direct or multidropped lines to a central node (a central computer, a concentrator, a multiplexer or a message-switching processor) subject to constraints on the number of terminals and total traffic in each multidrop line.

Such constraints are necessary to ensure line capacities are not exceeded and the delay time for a response along any given line is kept within desired bounds.

### Design Study

To illustrate the potential impact of using modern network design techniques to cope with the combinatorial aspects of the network planning problem, it would be useful to examine the results of a study conducted by Network Analysis Corp. for a centralized network containing roughly 1,500 terminals around the U.S. communicating via multidropped lines to a central processor complex in Hartford, Conn.

This study involved a sequence of optimizations starting with the existing configuration (containing concentrators) and ending with a system using multiplexers and concentrators whose layout was optimized via modern design programs with response time and line loading constraints obtained by using the hybrid simulation/analysis methods discussed above.

The net result (see the following table) was a reduction in cost of approximately 20% with a simultaneous improvement in terminal response time.

| (All Designs Contain Concentrators) | Cost (000) | Worst-Case Terminal Response Time (Sec) |
|---|---|---|
| 1. Original Design | $1,370 | 37.5 |
| 2. Concentrator Deletion | $1,251 | 37.8 |
| 3. Control Unit Constraint | $1,214 | 21.5 |
| 4. Traffic Constraint Based on Analysis | $1,158 | 6.4 |
| 5. Traffic & Control Unit Constraint Based on Hybrid Simulation/ Analysis | $1,137 | 6.8 |
| 6. MUX, Traffic & Control Unit Constraints | $1,087 | 6.9 |

**A Sequence of Optimization for a Centralized Design**

Only a few years ago such an improvement in cost and performance would have been impossible. Over the next few years, these techniques will be mandatory for the planning of any complex system because of the difficulty of coping with all of the component and transmission tariff parameters on a manual basis.

*Frank is president of Network Analysis Corp. in Glen Cove, N.Y.*

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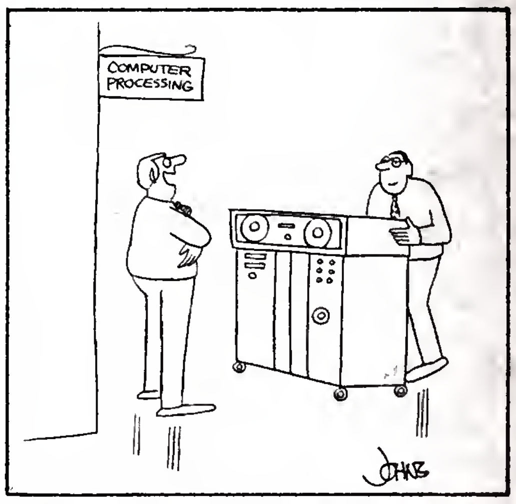
# New Innovations Seen 'More Scarce Today'

*(Continued from Page S/5)*

will have to average $40/mo and time-sharing will have to cost 15 cents/CPU sec or $2/hour of connect time. Centralized and time-shared word processing will have to be further developed, they noted.

All these conditions will probably be met by 1986, Cerf and Curran predicted.



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## *Investment Must Assure Payoff*

# After Acceptance, Where Will Retailers Go With POS?

*(Continued from Page S/21)*

tion. Data communications costs are decreasing while reliability is increasing. Distributed processing, interactive networks and software directed terminals and minicomputers provide flexibility. This is especially true in inventory control and merchandising applications.

For example, a new retail system might use distributed processing techniques in its design, including a programmable store level minicomputer on which a variety of reports can be generated. These reports will help store operating management be more responsive and in better control of individual functions.

Also, modern POS terminals incorporate video displays that increase interactivity between the system and the sales floor. The retail system leads a salesperson through a transaction, enforces transaction procedures as developed by management and permits inquiry to different data bases with the answer displayed on the screen.

The hardware and communications systems that will allow retailers to make further POS activities pay off are available today. Now manufacturers and retailers will have to concentrate on software development to get POS information into a more useful form. Integrated hardware/software communications networks will require highlevel software that can be easily modified and changed by retailer.

Software development to date has been executed on a specific basis — usually for a particular application area and not necessarily tied to current POS interactive operatins. There are good installations which have concentrated on one or two of the following areas: accounts receivable, accounts payable, fashion merchandise, big-ticket inventory and staple stock.

One of today's high payoff application areas is purchase order management. In fact, as an industry buzz word, it has replaced "total management information systems" used a few years ago. Developed properly, big efficiencies can be achieved by reducing the labor intensive operations of tagging, ticketing and auditing merchandise.

And there is the natural follow-through in the control of information that conforms to the retail loop — ordering, receipt, payables, marking, sales and receivables.

### Time to Develop

Good applications software takes time to develop. Software development now accounts for the largest portion of any system investment. As a result, the retailer will enhance and expand his system on a building block basis. He will look at each specific operation, decide where he can get the biggest payoffs and then move from there.

### Must Be Acceptable

Thus the POS system and equipment users are looking to today must be very adaptable to meet growing and changing requirements. The user must be able to integrate new applications as they become cost-effective or are mandated by legislative changes. He must be able to expand his system in a planned, orderly and economical way. And he must have the ability to fine-tune the information generated by his system to increase profits. That seems to be where we're going and that's how the retailer will justify his future POS investment.

*Barnes is vice-president of retail marketing for TRW, communications and systems services, Los Angeles, Calif.*

# Shipper Planning Data Links for '77

*(Continued from Page S/25)*

ing centers at approximately $320,000 and said competing small computers might well have cost 40% more.

### Development Costs

"The cost of program development was a factor in Wang's favor. Typically, software development costs are about twice the cost of the hardware," he said. "In our case, they are running only about half the cost of the hardware, and we are doing all of our applications programming ourselves.

"We are in a very competitive field. The distributed data base system is helping us provide better service in Europe, but it is also improving our internal controls.

"When the transmission of data begins in February from the 2200 in Rotterdam to the 370/135 here, those internal controls will be even stronger and we will have a much better ability to serve our customers," Keahon said.

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## Uses Two 370s, 25 Minis and 480 Terminals

# Distributed Processing Net Keeping Mopac on the Track

By Nancy French
Of the CW Staff

CHICAGO – A distributed data processing system is helping the Missouri Pacific Railroad (Mopac) increase freight car utilization and decrease handling errors – both problems that make many railroads unprofitable, according to James A. Shattuck, Mopac's manager of Transportation Control System (TCS) development.

To give a recent conference audience here an idea of how critical a problem underutilization of freight cars is, Shattuck explained only eight out of every 100 freight cars, on the average, are actually loaded and moving toward their destinations at any given time.

The rest, for a variety of reasons, are idle and producing no revenue.

The TCS system – which is actually a control system rather than a management information system – took 130 analysts and programmers about five years to develop and cost $45 million, Shattuck said.

Mopac, one of the nation's few profitable railroads, built the system around two IBM 370/168s located in St. Louis. The mainframe communicates with 480 terminals and 25 minicomputers via 100 communication lines. With the exception of 29 dial-up lines, all are bisynchronous 2,400 bit/sec leased lines.

TCS schedules loaded cars and distributes empty cars. As part of its scheduling operation, the system prepares a "trip plan" for every freight car that describes – before it even leaves the freight yard – exactly how that car should be handled all the way to the customer's siding, Shattuck explained.

The trip plan indicates the train to which the car should be attached, where it sould be "set out" and which other trains should pick it up for the different legs of the trip.

The yardmaster responsible for making up each train obtains information on what is required by accessing a data base maintained in the TCS central computer. He then finds out where in his freight yard the necessary cars are located from a real-time local data base known as the Yard and Terminal System (Yats), maintained in his office, according to Shattuck.

After a train is made up, TCS provides work orders to the conductor indicating everything that must be done en route, including what cars to pick up at various stops and what cars to set off for pick up by other trains.

### Car Distribution

The second critical function provided by the system is car distribution and deals only with empty cars, Shattuck said.

When a car is unloaded at a customer's dock, for example, the customer contacts Mopac and "releases" the empty car. This "release empty" information is fed into TCS to obtain the optimum destination for that empty car.

In accordance with rules laid down by the American Association of Railroads and the Interstate Commerce Commission, TCS assigns the empty car an optimum route and destination based on supply and demand.

Simulation tools built into the system assure the plans for individual cars are coordinated with the overall system, Shattuck noted.

Yats maintains a computerized car inventory with the track location of every car. It will automatically determine the next track to which a car should be switched based on car-scheduling information received from TCS, he said.

### Track Switch Requests

When the yardmaster decides to switch a track, he uses his CRT to request a switch list on that track. The system displays the list, including the next track assignments for each car, and the yardmaster reviews the list to select the remote printers that will receive the list.

When switching is complete, the exceptions, if any, are recorded and the inventory is updated.

Each of the six largest locations – those with inventories of 2,000 to 6,000 cars – is equipped with two Digital Equipment Corp. PDP-11/50 minicomputers with 128K of memory, three 40M-byte disk drives, 19 DEC VT05 CRTs, 20 Univac DCT-500 remote printers and two DEC LP-11 line printers.

As backup, the peripherals, including some core, can be switched from one mini to the other, Shattuck explained, adding the backup processor acts as a communications front end between the freight yard and the central office.

If the backup goes down, communications can be handled by the remaining processor, he said.

Service centers in 51 locations enable customers to place orders for empty cars, provide shipping requirements, trace or divert car movements and provide bill-of-lading instructions with a single telephone call, he explained.

Customer service centers throughout the 12-state service area which Mopac serves are equipped with 104 Incoterm CRTs emulating IBM 3270s using IBM 2770 protocol. The CRTs are tied into the St. Louis center, he said.

At the general office, 91 IBM 3270 CRTs and 16 IBM 3286 printers are tied into TCS so users can monitor operations, control locomotive fleets, distribute empty cars and report train exceptions such as annulments and extra trains.

Clerks in the accounting department use 24 IBM 3270 CRTs to rate all waybills centrally.

However, since the job of railroad car movement and train makeup activity actually takes place in Mopac's 110 freight yards, computer power has been dispersed to these locations as well, and that's where Yats comes in, Shattuck explained.

Why did Mopac choose a decentralized rather than a centralized approach for its Transportation Control System? See story on Page 38.

The 17 smaller yard locations, with inventories of 300 to 2,000 cars, are each equipped with an 80K DEC PDP-11/40 minicomputer, five to seven VT05 CRTs, two LP-11 line printers, five to 12 Univac DCT-500 remote printers, a fixed-head disk and three 2.5M-byte cartridge disk units.

A key point, according to Shattuck, is that whenever a change is reported to Yats, the same information is automatically forwarded – with no manual intervention – to TCS, and vice versa, to assure cars are not mishandled. Information needed locally, on the other hand, is kept locally.

At the smallest yards, where inventories range from 25 to 100 cars, an intelligent terminal with a display unit, one printer and two diskettes is used to report to TCS and maintain the needed local information.

At the 63 medium-size yards, where inventories range from 100 to 300 cars, a card-oriented system which involves some manual manipulation of cards in cubbyhole systems corresponding to the tracks is still being used.

A 16K Incoterm SPD-20 equipped with a card reader, card punch, line printer, CRT, two diskettes and up to two Univac DCT-500 printers makes up each of these yards' system.

Besides satisfying central system reporting requirements, Yats has reduced clerical burdens by eliminating the card system used by most railroads in nearly half the yards, Shattuck said. Remote printers and CRTs provide fast access to car information where it is needed, he added, and the system allows local railroad personnel to prepare local management reports.

# Scan-Optics Has Scanedit Series Uniting OCR, Key-Entry Systems

E. HARTFORD, Conn. – The Scanedit 300, 600 and 3500 systems from Scan-Optics Corp. are integrated optical character recognition (OCR) and key-entry systems, the vendor said.

The minicomputer-based units, which operate off-line, are connected to each other via a "computer-to-computer" link, presenting users with a system that can concurrently scan, transmit between the parts of the system and perform key-entry tasks, according to a spokesman.

The systems are aimed at users with varying degrees of OCR and key-to-disk requirements, he added.

The Scanedit 300 was designed for the high-volume user with limited video-processing and key-entry needs. The 600 serves such application areas as order entry and inventory control in which users need a moderate number of terminals and increased disk capacity.

The 3500 is suited to users with high-volume image-processing, OCR data capture, key-entry and background-processing requirements.

The 300 can accommodate up to eight CRT terminals; the 600 can accommodate 12 terminals and up to 32 terminals can be linked to the 3500.

A video image is made up of items that cannot be read by the scanner. The image is then stored on disk and displayed at the key-entry operator's CRT for data entry, he noted.

The systems come with a full complement of software, he added.

A basic Scanedit 300 system with either a page or a document reader, 24K bytes of memory, two 9-track tape drives, an I/O console, a 32K Model 1 terminal controller, a CRT, key-entry terminal and 1.4M bytes of disk ranges in cost from $5,100/mo to $7,000/mo on a rental plan. It costs $260,000 to $350,000 to purchase.

The price depends on options and the amount of software and includes the communications link, the spokesman noted.

The Scanedit 600 with a Model II terminal, additional disk controller and increased expandability ranges in price from $6,600/mo to $7,200/mo or from $287,000 to $365,000.

The Scanedit 3500 with the basic configuration and a Model 3 terminal controller with 64K words of memory, two CRTs, four key-entry terminals and one 29.2M-byte disk ranges in price from $8,200/mo to $10,500/mo or $414,000 to $520,000.

Scan-Optics is at 22 Prestige Park Circle, E. Hartford, Conn. 06108.

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## *And the Costs of Collection*

# Authorized Service Helps Merchants Beat Bad Checks

By John P. Hebert

Of the CW Staff

CHARLOTTE, N.C. – Local merchants have stormed to a computer-based check authorization service to reduce large numbers of bad or "rubber" checks from bouncing profits out their doors.

The businesses – large and small – are subscribing to the Checkfax information service because "they always have a handful of returned checks" which are costly and time-consuming to track down, according to C. George Henderson, executive vice-president of the Charlotte Merchants Association (CMA).

CMA's 350 to 400 members, who began using the system last week, hope to reduce by 80% the number of checks taken primarily from the habitual bad-check passer, he said.

There is a two-fold philosophy behind subscribing to Checkfax, Henderson said. First, the service should, to a large extent, eliminate the high costs associated with attempting to collect on a bad check.

To make a rubber check one that is valid, the merchant must first correspond in some way with the passer and advise him of the legal implications of passing a bad check, he explained.

If this fails, the merchant must turn the matter over to law enforcement agencies or turn to a collection agency and possibly seek court action, he said.

Secondly, if the service does cut down on the amount of returned checks, it will make businesses more profitable. Theoretically, Henderson added, those savings could be passed along to the consumer.

Checkfax is a software package and documentation requiring two IBM mainframes – a 7 and a 3/10 – and a tone-type telephone at subscribing retailers, according to the service's developer, Pete Prophit.

The consumer's driver's license number or substitute card from the state motor vehicle department or public safety department is keyed into the system over dial-up lines, Prophit explained.

The computer system (in Charlotte's case, it is located in Greensboro, N.C.) tells the merchant, in a woman's voice, two things: a personal code rating from 1 to 9 for that particular driver's license number, comprising the check-cashing history, and an activity number, or number of calls made on that check corresponding to that license number in the past 48 hours, he continued.

Armed with this information, the merchant can decide whether to take the person's check. For example, if the person has a "9" for a personal code rating, it would indicate a bad risk because a high activity number, corresponds with a greater risk, he said.

In addition, every subscribing store gets a security number that must be entered via the telephone pad to identify the merchant as a valid user of the system, Prophit added.

The IBM 7 is equipped with a teleprocessing module, 24K of disk storage and a voice response unit.

An IBM 3/10 receives new information from merchants and law enforcement agencies and compiles it on files on a two-hour run every day. The disks, Prophit noted, are then manually swapped from the 3/10 to the 7.

The 3 has IBM 5440 disk packs holding 2.5M bytes each, he added.

### Privacy Considerations

Ken Uffman, owner of Checkfax's rights, and Prophit had to make the system conform to Federal Trade Commission requirements on privacy and credit reporting, Prophit said, adding the system is intended solely for check-cashing transactions, requires a merchant security identification code and gives the subscriber no written transaction material.

A merchant could, however, inquire about the check-cashing history of, for example, a prospective employee with the system, Prophit noted, adding it would be against state and federal laws to do so.

Even with those safeguards acting as a deterrent to abuse by subscribers, there is no way to prove a merchant did exactly that, Prophit agreed.

Although the service does list each merchant by individual identification number, the system does not log drivers' licenses which are the subject of retailers' inquiries, he said.

Merchants, on the other hand, have been subject to increasing losses from bad checks for the past couple of years, he said, explaining an increase in white-collar crime, the 1974 recession and the resulting inflation are primary causes for merchants subscribing to Checkfax.

### 'Fast and Simple'

With Checkfax, a merchant can voluntarily check on a consumer's check-writing history, Prophit said. "It is so fast and simple because the total transaction takes 25 seconds on the telephone."

Stores are "more than willing to save $100 a day by spending $50 each month" – the typical charge for the service, which is available 24 hours every day, he added.

Each inquiry costs the retailer no more than 10 cents and could only cost four cents for high-volume users such as food chains, which make a lot of inquiries.

### Public Reaction

Manual efforts could duplicate what the Checkfax service does, but the cost is prohibitively expensive, he added.

When asked about people reacting to a computer system compiling check-writing information on consumers, Henderson said there was no reason for the public to react negatively.

"Computers are everywhere, so what is there to get upset about?" he asked.

"Computers are a way of life" and in the case of Checkfax, the machines are good for people with good ratings, he said, describing the system's advantages.

The Charlotte district attorney looks upon the service favorably, because it will reduce the number of warrants for bad-check passers at Charlotte's police headquarters, which number between 7,000 and 8,000, Henderson said.

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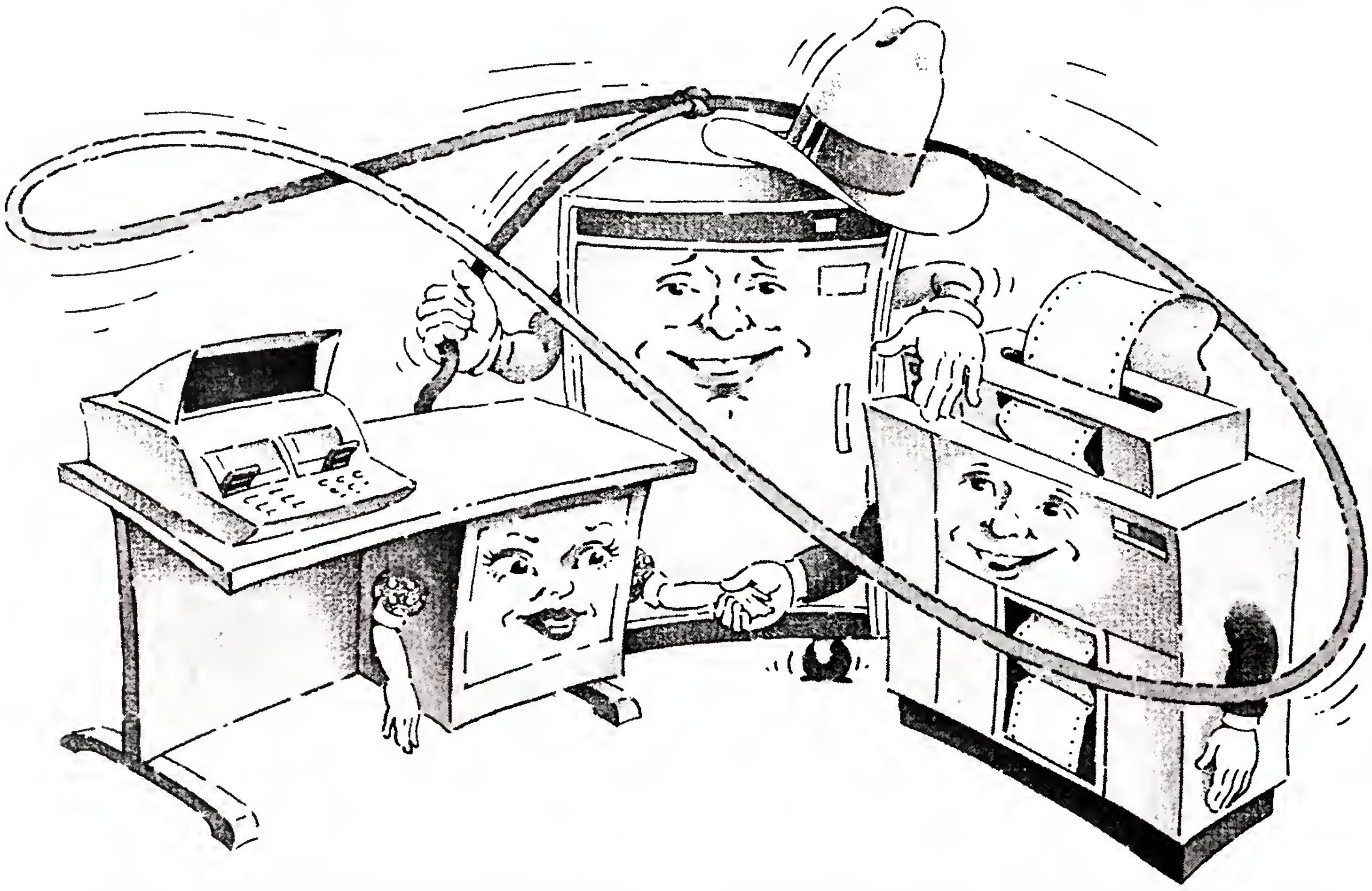

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# Mass. Hospital Saving $525/Mo With Microfiche

By Stephen L. Priest

Special to Computerworld

BROCKTON, Mass. – The Brockton Hospital, a 322-bed private nonprofit general hospital here, is realizing a $525/mo savings in paper, DP and man-hour costs by preparing accounts receivable trial balances on microfiche.

Previously multiple copies of six types of trial balances (alpha, numeric, preadmit, financial status, credit and under $5) were prepared weekly and semi-weekly.

The voluminous paper, distribution time and computer hours required to prepare and decolate the trial balances cost an average of $997/mo, not including the cost of storing selected trial balances for future reference.

A cost analysis of the way the trial balances were prepared prior to the switch to microfiche against the recently implemented service bureau approach showed that having the computer prepare a magnetic tape containing the trial balances and then sending that tape to a microfiche company would be the best way to go.

### Improvements Indicated

The study indicated that Brockton would eliminate paper, significantly reduce DP report preparation time because magnetic tape is several times faster than paper, reduce clerical distribution man-hours and have the reports available sooner than with the paper system.

Also, storage of reference trial balances would stop being a problem.

The hospital decided to go with a service bureau rather than an in-house system on the basis of cost. An in-house system would have cost about $100,000, which was too expensive.

Brockton uses Synergraphics, a COM bureau in Wakefield, Mass. The tape is taken to a bus line which transports it to a location where it is picked up by the service bureau. The completed microfiche is then returned to the hospital.

The magnetic tape is prepared on an NCR C-200 system with 32K of memory disk and tape.

The cost of transporting and producing the microfiche, including the purchase of 10 microfiche viewers amortized over 36 months, averages $472/mo. Thus, the hospital is realizing an average savings of $525/mo using microfiche-prepared accounts receivable trial balances.

Presently other areas of microfiche usage are being investigated.

*Priest is manager of data systems at the Brockton Hospital.*

# Kodak COM Unit Operates On-Line

ROCHESTER, N.Y. – The Eastman Kodak Co. KOM-85 computer output microfilm (COM) unit is designed to operate off-line or on-line to a turnkey minicomputer front-end unit.

The system, which is capable of producing microfilm at 120,000 char./sec transfer rates, offers a variety of reduction ratios and formats, the firm said. Both 16mm and 35mm roll film as well as microfiche in widths of 82.5mm and 105mm can be produced.

In addition, an expanded-page format capability has been optionally added. This allows the microfilmer to create pages that are wider and deeper than the standard 132 char./line by 64 lines per page, the firm said.

Pages with up to 172 char./line and 88 line/page can be filmed, accommodating all existing computer-page formats, the firm noted.

Film cassettes can hold up to 1,000 ft/load, the company added.

Operator control of the size and aspect ratio of characters displayed and filmed is another feature. Independent adjustments for character height and width permit this control, the firm said.

### Column Indexing Feature

A column indexing capability that allows the user to place an index above or below each column of pages helps users to locate desired data.

High-contrast fiche titles and "eyeball' characters" are achieved by a dense character that does not require overprinting, the company noted.

COM formatting can be handled with Kodak Info-Link software or formatting programs may be written by the user.

A turnkey minicomputer system – the Hewlett-Packard magnetic tape reformatting system – is a front-end system for off-line reformatting of print-image tapes.

The minicomputer system has 32K of memory, an intelligent terminal with two read/write cartridge drives, CRT display and a tape drive. Both seven-track and nine-track tapes from 200 to 1,600 bit/in. in NRZI and PE formats are accepted, the firm said.

The KOM-85 will be available in spring 1977 and costs $116,000, the firm said from 323 State St., Rochester, N.Y. 14650.

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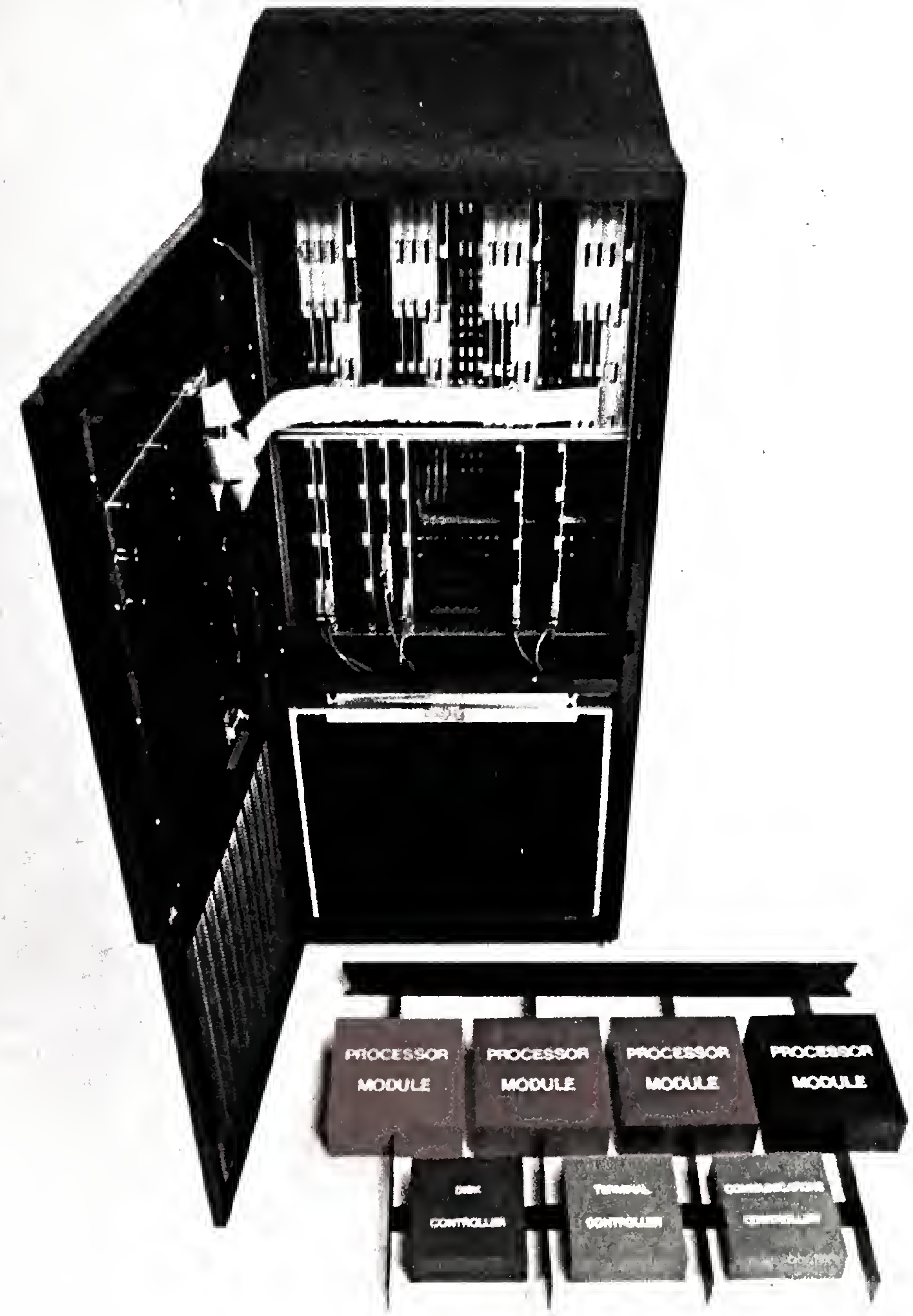

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TANDEM

# Study Points to Decentralized Approach for Mopac

CHICAGO – The St. Louis-based Missouri Pacific Railroad (Mopac) chose the decentralized rather than the centralized approach for its Transportation Control System (TCS) largely on cost considerations, but not before performing a three-step analysis of the new applications, according to James A. Shattuck, manager of the TCS development project.

The first step was task definition, he said, which involved defining and documenting the objectives of the system and identifying the application tasks needed to reach these objectives.

All interfaces with existing systems also were reviewed and documented, he said.

The second step involved a statistical analysis of transaction volumes based on actual activity which showed the system would exceed 75,000 program loads per day and would process more than three million application file accesses. The total number of messages weas estimated at 130,000 per day containing more than 49 million characters.

Minicomputer and central computer hardware requirements were established from this information, Shattuck said.

The third step comprised an economic and logical analysis of three development strategies: a local minicomputer approach, a central integrated computer approach and a central independent computer approach, Shattuck said.

The central integrated system would have required merging the yard and terminal function into the central TCS design, vastly increasing the complexity of the system, he explained.

It also would have increased development costs and delayed cutover of future phases by 10 to 12 months, he added.

The central independent strategy involved developing the Yard And Terminal System (Yats) on a central computer as an independent subsystem of TCS, Shattuck continued.

This approach would have required only minor modifications to current TCS design without increasing the complexity of the TCS system development, he said.

However, he added, the central hardware to operate the system would have needed upgrading to backup the on-line computer and handle the increased software development requirements.

Communications also would have needed upgrading.

The local minicomputer system strategy adopted was simpler and, in terms of monthly rental prices, was estimated as 95% less costly than either of the two central system approaches, Shattuck said.

### More Development Opportunity

The decentralized approach also offered Mopac the opportunity of developing Yats as an independent subsystem without any central system modifications.

The decentralized system can be expanded with greater ease as the need arises, Shattuck said. And, in the event of a central system failure, the independent subsystem can continue to process local functions while offering better response time.

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WANG

## Geac Adds Printer

MARKHAM, Ont. – A receive-only chain printer with controller which accepts print data in serial Ascii form is available from Geac Computer Corp.

The Model 40, which can be remotely operated, comes in friction or tractor-feed formats and has a print speed of 9,600 bit/sec, Geac said.

The controller is pollable, permits full remote computer control of the printer and provides automatic parity error detection, the firm added.

The printer and modem interface costs $5,800 in an 80-column version; the 132-column version costs $7,200. Geac is at 450 Denison St., Markham, Ontario L3R 1B9.

## Counter Tells When to Reink

BURLINGTON, Mass. – The Computer Link Corp. line counter was designed to let the user know when to reink a printer ribbon and therefore stretch the ribbon's life.

A Ribbon Management System can avoid wasted time, paper and reruns caused by poor printing resulting from overused ribbons, the company said.

The line counter costs $295 from the firm at 14 Cambridge St., Burlington, Mass. 01803.

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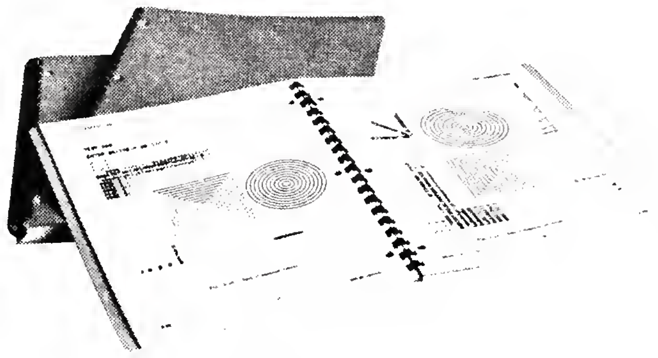

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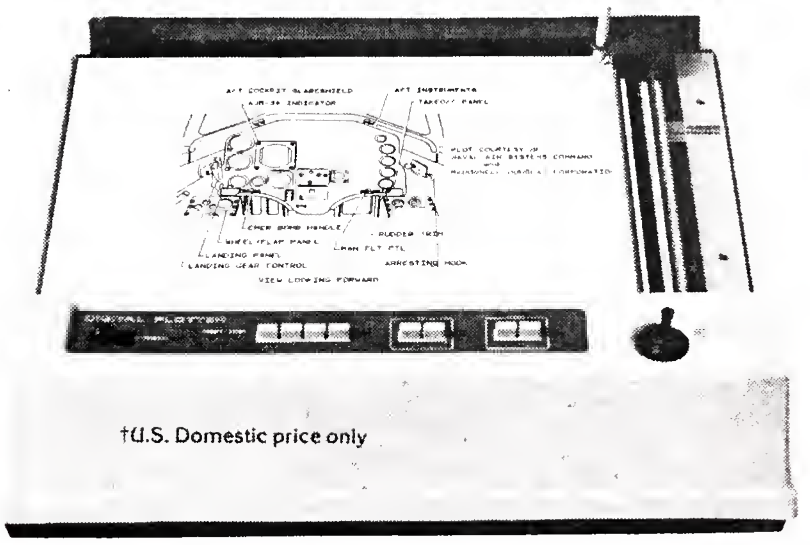

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The problem with your big computer is that it was designed to work in batch. A mode of operation that has made your mother all too human.

It's the reason your mother has to be fed awkward media like punched cards. It's also why she can't accept data from its source, and has to spend time editing and verifying that data.

And it's the reason your big computer can't provide reports on demand. In formats that work better for your users than for her.

But don't throw up your hands and walk away. Instead, get your mother a little help. A computer that can take some of that load off her.

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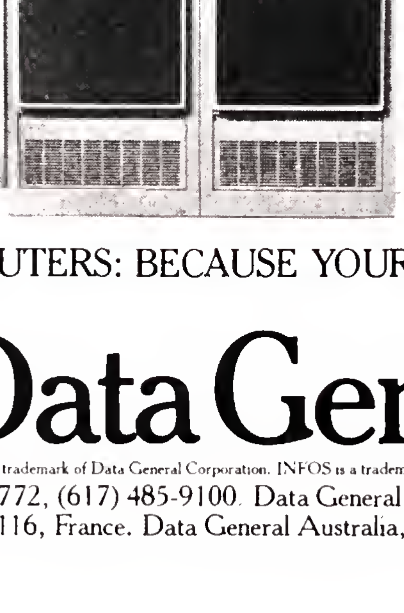

The commercial ECLIPSE computer is smaller than the big computers you may be used to using. But it has the things big computers have. A commercial instruction set that has an EDIT function, for example. And large memory configurations.

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## Mini Bits

### *Tycom Key-to-Floppy Fits Small IBM Systems*

FAIRFIELD, N.J. – An IBM-compatible key-to-floppy disk system has been introduced by Tycom Systems Corp.

The Tycom 3741, consisting of an IBM Selectric, floppy disk unit and electronic console, collects data on the disks which can then be stored or retrieved by means of the Selectric, a CRT or an IBM 5100 portable computer, Model 3741 or System 32, the company said.

The 3741 uses the Ascii format, is Teletype-compatible and RS-232 asynchronous with speeds selectable from 110- to 9,600 bit/sec.

Any Teletype-compatible Ascii terminal can be connected directly to the disk system and can command the disk file, Tycom noted.

A special program sequence can be written for the 5100 to output data continuously from the tape cassette to the disk through the serial I/O adapter, the firm added.

The Tycom 3741 is priced at $7,750, the company said from 26 Just Road, Fairfield, N.J. 07006.

### Controller Made for Interdata Use

MOUNTAIN VIEW, Calif. – The TDC803 single-card disk controller from Minicomputer Technology was designed for use with Interdata systems.

The controller, which interfaces to up to four California Computer Products, Inc. (Calcomp) Trident disk drives, occupies one slot in the chassis of an Interdata mini, the firm said.

The TDC803 features sector buffering so it can be operated with or without a selector channel, the company added, and includes rotational position sensing, dual-access capability and an on-board logic probe.

It contains 512 bytes of internal random-access memory (RAM), permitting up to 446 data bytes to be stored per sector, the company noted. The RAM can be expanded to 2K bytes.

The controller comes with cables to the first drive, a diagnostic formatter package and drivers for the Interdata operating system.

The TDC803 costs $1,900, the firm said from 1901 Old Middlefield Way, Mountain View, Calif. 94043.

### Electric Utilities Get Turnkey

EVERETT, Mass. – Minicomputer Systems Technology, Inc. (MST) has a turnkey minicomputer system for electric utility companies.

Called A Better Administrative Computer Utility System (Abacus), the system is based on Digital Equipment Corp.'s PDP-11 CPU and MST proprietary applications software developed in DEC's Dibol, the firm said.

Configured around a PDP-11 with 64K bytes of memory, the system can include up to 64 CRTs, up to 88M bytes of disk and one or more printers. Abacus was designed for utilities with from 2,000 to 70,000 accounts, MST said.

The 40-program software package is written in a menu-oriented style that allows users to pick jobs, subjobs or functions from lists on the CRT.

It provides billing, automatic estimating, dunning notices and reports, accounts receivable, ledger card and management reports, MST said.

A basic Abacus costs $50,000 with the price varying according to the configuration. MST is at 137 Ferry St., Everett, Mass. 02149.

### *Saving About $20,000/Year*

# Billboard Firm Switches From Batch

By Esther Surden
Of the CW Staff

LOS ANGELES – Switching from a batch-oriented small system to an on-line minicomputer will save Pacific Outdoor Advertising (POA) here an estimated $20,000/year in keypunching costs, according to David Sanford, manager of information systems.

The batch system was "just too expensive," Sanford said. The company's increasing growth and the prospect of the data center becoming the corporate data center for the firm's parent company caused POA to look around for an on-line system.

The POA considered systems from Burroughs, NCR, Digital Equipment Corp., IBM, Varian Data Machines, Univac and Hewlett-Packard (HP) and narrowed the field to DEC, Burroughs, Varian and HP through a request for proposals.

Its decision was made on a variety of criteria including cost, throughput performance, the business-oriented languages available on the systems, operating system capabilities, on-line capacity and the software available for the systems.

Finally, a benchmark was run to determine if the systems could handle a proprietary updating package developed in-house. The results pointed to the HP system, Sanford said.

"Under the NCR Century 101 system, the package took 70 hours a month to perform a major update while the HP system can do it in 20 hours a month," POA found.

#### Tracking Franchises

The firm owns and manages over 6,000 billboards and hand-painted panels in southern California. Each board is a separate franchise and requires extensive records to keep track of it.

The amount of paint and paper needed for each advertisement also must be monitored and inventory kept in check.

The firm is third-party leasing an HP 3000-II Model 7 with 256K bytes of memory, 150M bytes of disk, a 1,250 line/min printer and 15 terminals. In addition, the programmers have portable terminals at home.

The system costs the firm about $4,700 monthly without the terminals, Sanford reported.

An upgrade to a Model 9 is planned to acquire 512K bytes of memory in the first or second quarter of 1977.

POA is making extensive use of HP's Image data base language and its Query capability, Sanford said. "All systems are being put in a data base," he added.

Conversion to the HP system from the NCR was a large task because "everything had to be redesigned," he said, noting most programs were shifted from batch to on-line.

So far accounts payable, accounts receivable, payroll and part of a proprietary real estate package to be implemented in five stages are running. General ledger should be up by January.

Planned applications include a billboard system to keep track of the cost of operation of the 6,000 bill boards and a merchandising system for signs made for clients whose products appear in supermarkets in southern California, Arizona and Nevada.

#### Billboard Restrictions

Another system will keep track of restrictions on billboards. "In some cases, if the boards are leased from private people, there are restrictions on how they can be used. For example, some say work can't be done before 8 a.m. and others do not want liquor or tobacco advertised on the signs," Sanford explained.

An extensive data base is maintained of these restrictions, he noted.

Terminals are located in the personnel, financial, operations, leasing, merchandising and management departments as well as in the computer room.

Users can generate their own reports on the screen, saving printing costs, Sanford said. The terminals at the programmers' homes are connected through ordinary 300 bit/sec telephone lines.

The projected savings will be realized in areas such as the elimination of the need for keypunch people and machines, he said.

Eight people work with the system besides Sanford. Although the system is up 24 hours, the computer room is operated only during the day.

# User Credits On-Line System With Keeping Lab in Business

By Edith Holmes
Of the CW Staff

COLUMBUS, Ohio – "Our lab is alive today primarily because of our on-line minicomputer system," according to Richard J. Freuler, a research associate with Ohio State University's Aeronautical and Astronautical Research Laboratory (AARL) here.

"The system helped us keep our heads above water during the severe inflation of 1974-75, a time when a number of labs dedicated to fundamental research were phased out," he added.

Just how "alive" is AARL at Ohio State? Well, it helped to calibrate one of the temperature-sensing mechanisms for the recent Viking missions to Mars, Freuler said.

Working under contract for Martin-Marietta Corp., the lab had to test the temperature probe responsible for helping scientists on earth keep Vikings I and II cool enough while entering the low-density, carbon dioxide Martian atmosphere.

"We must have been right in our calculations because both Vikings landed," Freuler stated, adding "we never could have completed this work in the time required with our old analog computer."

The analog system was what AARL had prior to acquiring a Harris Corp. Slash 5 CPU and developing its on-line, real-time data acquisition and reduction system.

Wind tunnel tests of the characteristics of airfoils or airplane wings, the mainstay of the laboratory's experiments, took days to analyze under the old system, Freuler said. Slide rules and hand calculators were used to convert the data gathered by the analog system to usable form.

Since September 1973, when the Harris system was installed, the lab has gathered data in digital form through a real-time front end – an analog-to-digital converter. Freuler noted that data in digital form from the wind tunnel tests can be massaged immediately for results.

In addition to the Harris CPU with 32K words of memory, which Freuler maintained is really a medium- rather than a mini-sized processor, the AARL system presently includes a 300 card/min card reader, a 450 line/min printer, a Teletype 33ASR and a 9,600 bit/sec Tektronix CRT.

When the lab selected its system three years ago, it benchmarked equipment from several manufacturers and finally had to choose between systems from Harris and General Automation Corp. The Harris Slash 5 was acquired primarily because of its 24-bit machine capability and the real-time characteristics of its operating system, Freuler said.

Dr. Stuart L. Petrie, the lab's associate director, points out a real-time plot to Richard Freuler.

The Harris CPU has been used in the Air Force and "has had a pretty good track record," he added.

In the last three years, the lab has had some problems with memory reliability, though not with the cores themselves, Freuler stated.

"The memory system as a whole has caused trouble and the problem appears to be with the backplane connectors," he said, noting "the problem is not severe

*(Continued on Page 44)*

# DEC Announces Cross-Over Units For Datasystem 300, 500 Lines

MAYNARD, Mass. – Two additions to the Digital Equipment Corp. Datasystem family introduced recently give users an upgrade path from the 300 to the 500 line.

Described as crossover systems, both units can be programmed in Dibol-11, DEC's business-oriented programming language, the firm said. The systems are source code-compatible, a spokesman noted.

The top-of-the-line DEC Datasystem 357 is intended for small- and medium-sized businesses that need no more than eight terminals and a single language. The 537 was designed for users who need about a dozen terminals and multiple language programming capability.

Both systems can be used as parts of computer networks, DEC said.

Using the Commercial Transaction System-300 operating system, a typical Datasystem 357 consists of a 64K-byte CPU, two 14M-byte RK06 disk drives, two CRTs and a printer. It costs $55,000.

The Datasystem 537, which uses the CTS-500 operating system, includes a 128K-byte processor, LA36 Decwriter II console, two 14M-byte RK06 disk drives, five CRTs and a printer; it is priced at $75,000.

The systems will be available in the spring, DEC said from Maynard, Mass. 01754.

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# One Prime com

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All CREATE systems are built from a family of compatible central processors and all are controlled by a uniform, multifunction operating system called PRIMOS. This means you can start with the smallest configuration to handle today's work load, and grow in modular steps to the highest level of performance, withou reprogramming. It also means that you can plan on the availability of the power and capacity of Prime's new top-end processor, the model 400. Here are the important specifications:

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There are six entry-level packaged systems in the CREATE series, ranging in price from $35,000 to $200,000. All can be easily expanded with a full range of peripherals, including disks, printers, terminals, electrostatic printer/plotter, unit record devices and data communication controllers.

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PR1ME

# English Urged to Replace 'Claptrap' Documentation

By Esther Surden
Of the CW Staff

SAN FRANCISCO – "It's time we cut out the claptrap you people circulate as documentation," George Plossl of G.W. Plossl & Co. told a group of minicomputer users here recently.

"User documentation should be in English," Plossl emphasized in a speech on minicomputers in manufacturing.

Telling the users the DP department's role in the future will be to manage the data base so everyone can interact with the same data base, Plossl said "there is no way manufacturing concerns such as yours will ever be controlled by the seat-of-the-pants approach used in the past."

Minis and micros, he noted, can provide the systems that will maintain better control.

A common mistake made by system users in the manufacturing end of business is an unrealistic master schedule, he noted.

"Bring in the engineering department," he urged. The engineers are "the greatest consumers of leadtime known to man," but without their help the schedule will break down, he said.

Accurate records are another must if an adequate manufacturing control is to be maintained. "Few people know how bad their records are" because there are no quantitative measures of record completeness, Plossl said.

Without accurate records "you can have a lot of junk coming out" of your system, he warned, and it's the customer who gets hurt when the records are wrong.

But the manufacturing people get hurt in the long run as well with oversupplies or shortages, he pointed out.

Getting the records in order "can be done in a reasonable time and people can be trained to make fewer mistakes," he added.

Training the people may be "the best profit improvement you may make," he said.

# On-Line System Credited for Keeping Lab Open

*(Continued from Page 41)*

and hasn't hampered our work."

Because AARL has "an electronics engineer type" on its staff of 20- to 25 people, "we do our own maintenance and mainframe field modifications, so we haven't called Harris for service often," Freuler said.

When the manufacturer has been called, however, its service has been "good to excellent," he added.

Essentially the lab's full-time DPer, Freuler and an occasional graduate student or two do most of the necessary applications programming using a modified version of the operating system supplied by Harris.

By employing a library of Assembly language subroutines which communicate with the analog-to-digital conversion system, most of the applications can be written in Fortran, Freuler said.

The lab also has Basic, RPG and various other languages available, although Freuler often programs in Assembler.

The research associate characterized the software service relationship with Harris as "the best I've ever run into. I can call Harris up in Ft. Lauderdale, Fla., and, if the problem is serious, it will be solved in a week's time," he said.

Harris "will also call me to see what I think of various fixes and solutions to software problems before it announces them," Freuler added.

### Expansion Next Month

Convinced that its computer system is a major key to staying in business – accomplished primarily by attracting federal funds – the lab will upgrade its computer system next month.

Planned additions to its present system are a Harris Slash 6 asynchronous CPU with 64K memory, a 600 nsec cycle time and floating-point hardware; a Harris Model 5530 storage module drive with 80M bytes; Harris model 6690 magnetic tape unit, operating at 75-, 800- and 1,600 bit/in.; a Zeta Model 3640 36-in. drum plotter; three terminals including a Harris Model 8640 alphanumeric CRT, a Digital Equipment Corp. LA36 Decwriter, a Texas Instruments 743 teletypewriter; a synchronous controller; and appropriate remote job entry (RJE) software.

"Initially, all of the duties (and most of the peripherals) of the Slash 5 processor will be taken on by the Slash 6. Then, as appropriate operating system software is developed, some of the real-time data acquisition functions will be restored to the Slash 5 in a dual-processor arrangement," Freuler explained.

The terminals will permit on-line editing of the computation done on data from wind tunnel experiments in addition to RJE to a number of facilities on campus and at the National Aeronautics and Space Administration Langley Research Center, where AARL is under contract to help set up a general aviation airfoil design and analysis center to serve the airline industry on a fee-charge basis.

The lab hopes to use its system to continue to develop data acquisition and reduction methods, Freuler stated. In particular, AARL wants to design a digital system that will allow data collection from up to 20 sensor channels in a wind tunnel at speeds of 100,000- to 200,000 sample/sec from each sensor.

No one has ever created a high-speed, multichannel digital data acquisition system before, Freuler said. At best, some conversion systems can collect 100,000 sample/sec from one sensor.

This kind of expanded data acquisition and reduction system would help AARL in its acoustic research and in its study of unsteady pressures for fluttering airplane wings, among other things, he noted.

The system will be "the digital equivalent of a 28-track FM tape recorder and can be built for slightly less money than such a recorder would cost," Freuler added.

And the lab isn't stopping there. In addition to its primary computer system, AARL is developing a real-time digital data acquisition system to go up with small aircraft in flight testing rides.

Photographed on location at Loch Duich, Scotland

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# Add-On Floppy for DEC PDP-11 Offered by Charles River Data

WALTHAM, Mass. – Charles River Data Systems, Inc. has a floppy disk add-on system for the Digital Equipment Corp. PDP-11 series. The FD11 system is hardware-, software- and media-compatible with the RX11 disk drive, according to a spokesman.

In addition, the FD11 provides write protect switches, unit select switches, 6 msec track-to-track access, modular construction, single Unibus load for up to four drives, programmable read-only memory (Prom) self-diagnostics and a bootstrap loader, he added.

### Single Card

The interface, formatter, Prom and other PDP-11 interface logic is provided on a single "quad" card which plugs directly into one of the processor's peripheral slots.

The FD11 costs $2,500 from Charles River Data Systems at 235 Bear Hill Road, Waltham, Mass. 02154.

# Tally Matrix Printer Uses Internal Micro To Compute Distance

KENT, Wash. – A 160 char./sec matrix printer that features bidirectional printing to achieve throughput speeds in excess of 200 line/min has been introduced by Tally Corp.

The Model T-1602 uses an internal microprocessor to compute the shortest distance to the next print position, Tally said.

The unit prints left to right and right to left, slews at 8.5 in./sec and moves the print head at an accelerated rate when not printing, the firm added.

### Standard Features

Standard features offered with the Model T-1602 include a 7 by 7 matrix font, double-width character capability, upper/lower case, forms length selection and self-test.

The T-1602 prints an original plus four carbon copies and handles form widths from 4- to 15 in.

A selection of interface controllers for minicomputers, data communications applications and emulation of other printers is available, Tally said.

Prices for the T-1602 start at $3,115. Tally is at 8301 S. 180th St., Kent, Wash. 98031.

# PA Designs Printer Series For Micro-Based Systems

SHELTON, Conn. – The DMTP-6 series of printers from Practical Automation, Inc. (PA) was designed for use with microprocessor-based systems, the firm said.

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# Interactive Minis in Cartography Lauded

SEATTLE – Although a large-scale computer system can process the data required to produce an accurate map, it cannot match the minicomputer-based system's ability to allow the cartographer to retain artistic control, according to Sam Cook, senior systems analyst at Calma.

No longer do cartographers need programmers to translate their direction into computer language, Cook told a meeting of cartographers here recently.

Detailing the developing use of minicomputer systems in mapmaking and automated cartography, Cook cited reasons why he believes mini-based interactive graphics systems are growing in popularity with cartographers.

- Such systems have the ability to "structure a data base into a file that may be used for analytical purposes. As a by-product, specialty and thematic maps are easily generated from the digital map file," he said.

Data must be generated from many sources, including manuscript and aerial photography. Therefore, one purpose of the system is source data entry or creation of the digital data base.

"Even the simplest aerial photograph must be interpreted by a user. This interpretation might just as well be combined with data entry, validation and editing.

"The end result is a more accurate digital data base, created in less time with less effort," Cook said.

- "In practical cartography, data must often be distorted for clarity. The large computer will, without outside intervention, reproduce its data precisely to scale with a frequent loss of legibility," the systems analyst said.

"Of course, many programs to automatically distort data have been written with varying degrees of success. But no computer can look at the map and decide where to apply distortion – much less how much distortion is required to guarantee legibility.

"Even worse," Cook said, "such methods are cumbersome to use. The interactive graphics system can easily permit the user to scan the map and say, 'Move the line to here.' "

- Interactive digital graphics systems also permit a cartographer to incorporate data quickly from many sources of varying accuracy and ensure their accuracy, Cook said.

"The interactive editing capabilities alone are sufficient justification for the systems' existence," he claimed.

- "The results of each task are immediately available in the most convenient form (as visual displays) without the necessity to prepare and check program input, submit a computer run and wait for the output," Cook said.

An interactive graphics system typically consists of a minicomputer to operate on digital data, a disk storage system and several terminals or workstations to provide access to the computer and disk.

The terminal includes a graphics display CRT and a digitizer. The digitizer is a means of easily converting a position in space to its numeric equivalent in the computer, Cook explained.

Large computers' limitations coupled with advances in minis have led cartographers in recent years to employ systems enabling them to interact personally with computers in their mapping activities, Cook explained.

"The cost of the modern large-scale digital computer makes its efficient use mandatory. To provide the requisite efficiency, the programs have become more and more sophisticated until only a specialist can use them efficiently.

"The advent of the low-cost minicomputer and 'turnkey' mini-based systems designed to do one function or class of functions has made the computer directly accessible to the user. Minicomputer systems today are used for field data collection, on-site process monitoring and control, computer-aided design, computer-aided drafting and a myriad of other uses.

Interactive tasks that a cartographer can perform personally in conjunction with a computer include area, length, volume and centroid calculations.

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# COMPUTER INDUSTRY

### If Mainframers Meet Users' Needs

## Value of Installed Systems Seen Double in Five Years

By Toni Wiseman
Of the CW Staff

CHICAGO – Current studies show the installed value of computers in the world will about double in the next five years if the computer manufacturers can produce new systems adequate to meet customers' needs, Frederic G. Withington told a recent meeting here.

These customer needs, according to Withington, senior staff member with Arthur D. Little, Inc., center around a general transition from batch processing to transaction processing, where fast response processing is provided from a data base via a communications network to the point of transaction.

All vendors recognize users will be demanding certain future system requirements, he said, including support of multiple environments, dynamic allocation of resources, automatic memory and file management, high availability and security (integrity, physical security and privacy) and ease of use.

It has become customary to refer to systems having such capabilities as "virtual systems," Withington noted.

"The virtual system is directed entirely in high-level languages and is entirely self-scheduling in the sense of memory, file and communications management," he explained.

"All stimuli presented to this system – run requests, inquiries, transactions for posting and program compilation – will be received by a conversational scheduler which diagnoses any problems in the stimulus, such as JCL errors, and schedules the required operations," he said.

### Improved Language

In addition, the conversations with users will be conducted for the most part in an improved command language, closer to natural language than the present ones; new programs and report specifications will be stated by the users in improved versions of present programming languages, Withington stated.

File management, memory allocation, resource allocations and all internal system management functions will be conducted by automatic, universal methods, he said.

While such a high level of virtual system operation is obviously difficult to achieve, a set of hardware and sofware design principles that have seen steadily increasing use should, if well and comprehensively implemented, enable computer vendors to manufacture systems approaching this objective, he said.

These hardware and software principles include automatic communications management, automatic file management, fail-soft, distributed processing, variable stored logic, virtual machines, self-measurement and easier programming.

"These all exist somewhere in some degree; the manufacturer's job is to get them all together and working," Withington said.

### 'The Hooker'

"But the hooker here is that most of these design principles decrease the efficiency of the system by substituting automatic, inefficient functions for things the user must now do for himself," Withington noted.

"Such systems are likely to be less efficient than those of today because more of the machine's resources will be used in performing housekeeping functions automatically than is now the case," he said.

"Market acceptance of these machines will require improvement in their basic performance per dollar such that their cost-effectiveness proves satisfactory," he added, noting the performance of the machines depends largely on the improvement that can be expected in the hardware components of the systems.

Within the components area, circuits 10 to 50 times faster than today's devices should appear within the next five years, he said. But here again there is a hooker since economies will mainly result from large-scale fabrication.

As a result, Withington predicted, manufacturers, to the degree possible, will use modules at the microprocessor and even higher levels in preference to the design of new specialized circuits."

### Memory Chip Design

Similar influences are occurring in the design of memory chips, Withington said, adding that incorporation of associative addressing logic on the chip will become prevalent.

For file storage, Withington predicted hierarchies of auxiliary storage devices will continue to be used through 1985, with the newer technologies appearing first at the high-speed, low-capacity end of the spectrum and then gradually superseding slower technologies as their costs per bit drop.

"Either magnetic bubble or charge-coupled device technology, or both, will be in widespread use by 1983 and are likely to appear in some product lines by 1977," he stated.

He summarized the situation for input/output devices developments by stating there would be little change in electromechanically oriented devices such as punch card handlers and impact printers.

Nonimpact printers, however, have great promise at both ends of the spectrum, he said, as thermal printers are steadily dropping in price and improving in capability at the low end of the price/performance spectrum and electrostatic and ink-jet technologies promise not only higher speed but also greater versatility at the high end.

Computer output microfilm (COM) usage will also increase, he said, and early voice input systems will begin to appear.

In the I/O field, terminals will remain the most important devices, however, with plasma panels slowly gaining on CRTs, which will probably remain the leading technology, he said.

These design principles and

*(Continued on Page 50)*

### President of GSD Notes

## Series/1 Marks 'Firsts' for IBM

By Esther Surden
Of the CW Staff

NEW YORK – With the recent introduction of its Series/1, IBM took its first plunge into the minicomputer waters.

The General Systems Division (GSD), which has been concentrating on first-time users and users who needed some handholding, is now going after the sophisticated user who can design his own system and even OEMs.

The Series/1 announcement [CW, Nov. 22] marks several "firsts" for IBM.

For example, it is the first time the GSD has test-marketed a product prior to its announcement, according to C.B. Rogers Jr., IBM vice-president and president of GSD.

The series was test-marketed to provide "insight into the marketplace," Rogers said. "We thought this was an area in which we should move with greater inputs than we had in hand."

The approach of selling the series at a component level is new as well. The traditional unsophisticated end user needed system software, languages and applications packages as well as handholding.

The Series/1 will be sold with a 90-day warranty, although the traditional maintenance plans are available at the usual rates.

With the Series/1, most of the software is not bundled and no applications-oriented products or programming languages are available. It is basically hardware for a systems designer to use to configure a system to suit his application.

In another departure, Rogers said "we would welcome orders from OEMs," adding IBM has not, however, changed its policy of not giving quantity discounts to large users.

"Classically we have been a one-price house," Rogers noted. The "longstanding policy" of treating customers equally no matter how big or small has not been changed, he emphasized.

Nevertheless, "we expect to get business from the OEMs," he continued while acknowledging the Series/1's pricing policy may take it out of the running for many OEM firms interested in large buys.

"There may be situations in which we will not be competitive, but we feel the Series/1 has reliability characteristics and a price that will be attractive."

Other manufacturers' equipment can be interfaced to the Series/1, Rogers added. User-designed interfaces for special equipment are a possibility, as well as the interfacing of the system to other manufacturers' mainframes.

"We would entertain accommodating an RPQ to design such an interface," he said.

"IBM will maintain an unmodified hardware portion of a system configured with other vendors' equipment," he noted, but will not maintain the other equipment.

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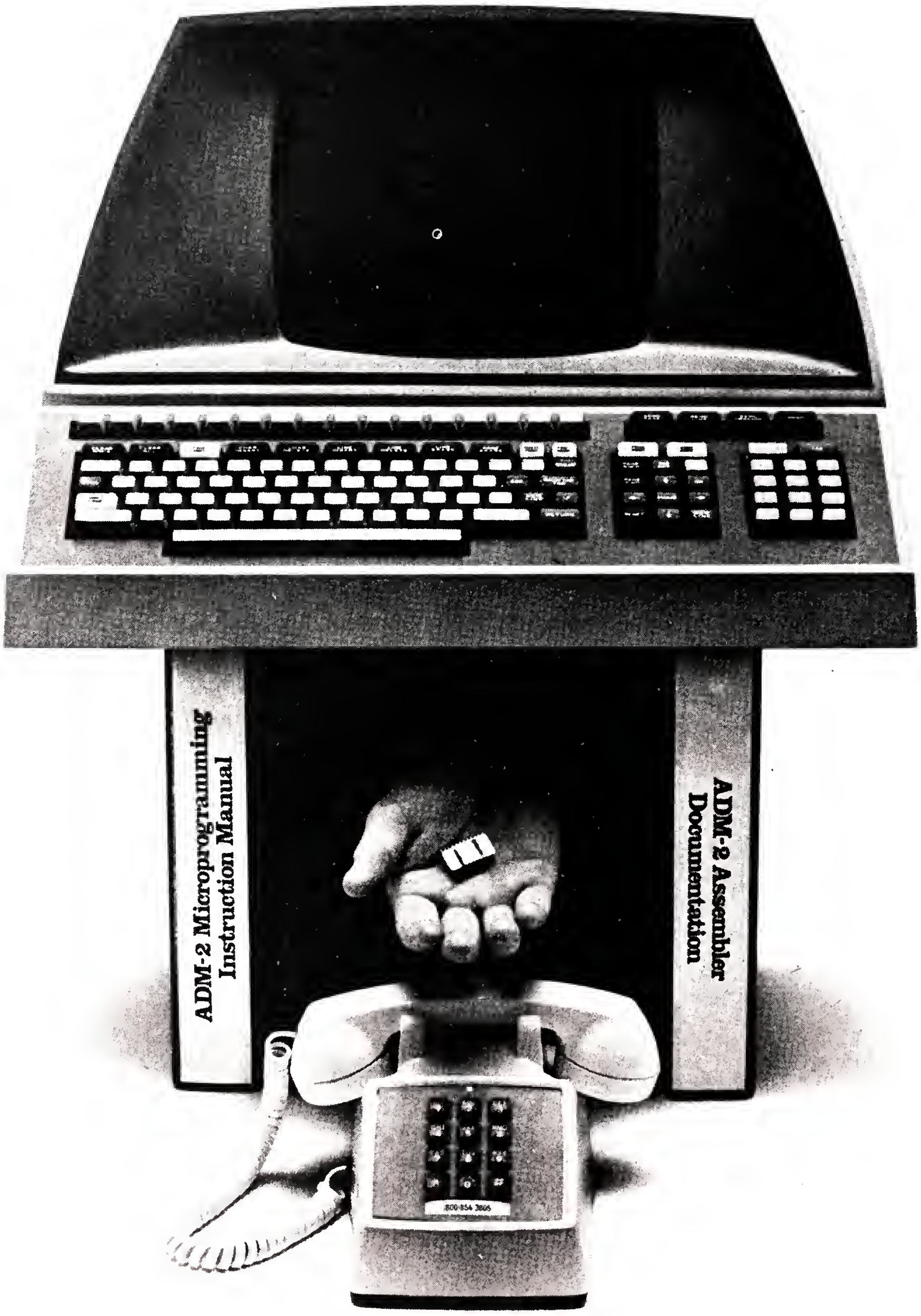

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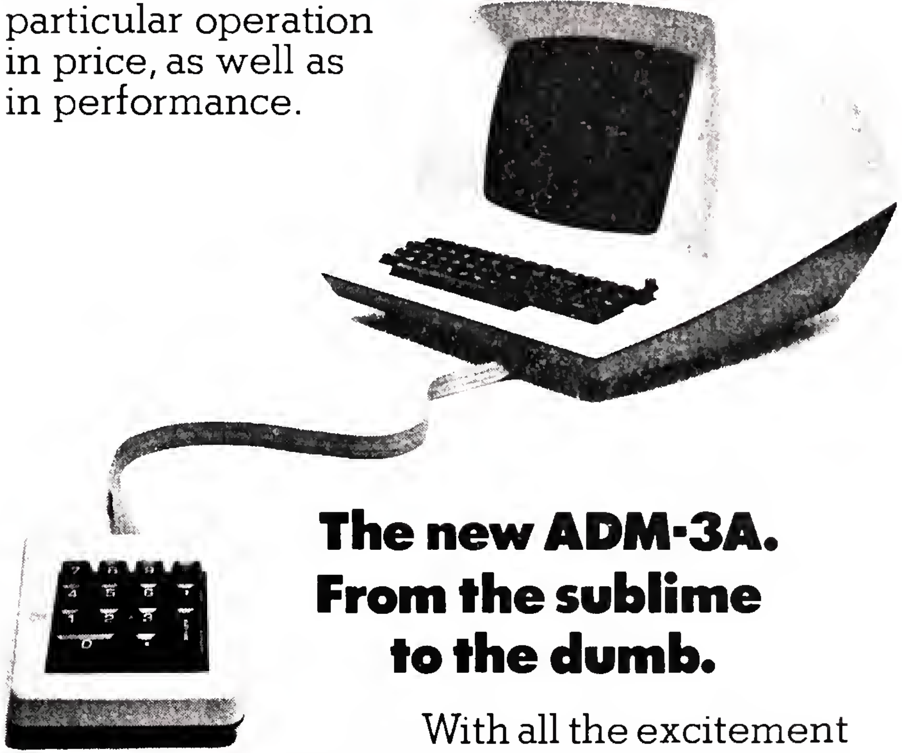

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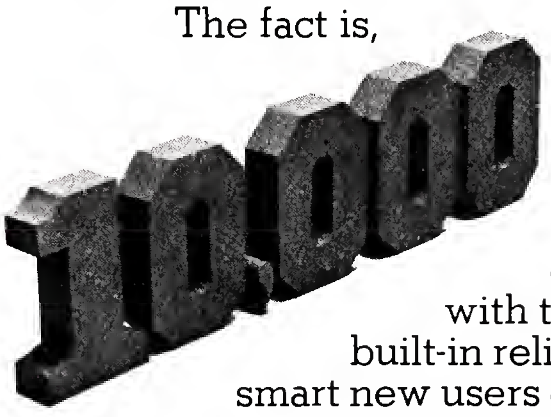

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# Memorex Almost Killed Itself by Diversifying: Guzy

By Catherine Arnst
Of the CW Staff

NEW YORK – In an attempt to enter initiative rather than responsive markets in the late 1960s, Memorex almost destroyed itself.

How that happened was explained by James Guzy, former executive vice-president of Memorex, during testimony in the U.S. vs. IBM antitrust trial recently.

Memorex was founded in 1961 as a manufacturer of magnetic tape, an attractive market because there were only two other major vendors of that product at the time, Guzy said.

By the end of 1967, Memorex had captured 40% of that market from those two firms because it offered a lower priced product, he said.

It was then that Memorex wanted to diversify into markets in which it had more control. Memorex management regarded the magnetic media it was manufacturing as "responsive" products because they were developed in "response to what other people were doing," he said.

Magnetic tape had to be manufactured to the specifications set down by systems manufacturers. In addition, since the price of magnetic tape was dropping, so were the profits of its manufacturers.

### 'Initiative' Products

The company wanted to move into "initiative" products – products which it developed and initiated itself. Memorex planned to diversify its activities into subsidiaries that handled either magnetic media or those products it initiated, Guzy said.

The end result of that plan was meant to be entry into the computer systems market, he explained.

Memorex could see the rapid growth of firms like Control Data Corp. and Digital Equipment Corp. and wanted a part of the greater profits it thought were available in the computer market, he said.

A three-phase strategy was developed to propel Memorex into that market. Phase 1, embarked upon in the spring of 1969, involved entry into the OEM market to raise cash and develop a sales and service capability within Memorex. Its first product was the 630 disk file, meant to attach to the IBM 360/40.

### Increase Sales

Phase 1 was intended to increase the firm's sales volume. The objective of Phase 2, started in 1969, was to develop the marketing force absent in Phase 1, Guzy explained.

With this intention in mind, Memorex started the Memorex Sales and Service Corp., he said.

During Phase 2, Memorex introduced a number of products. It expanded its disk file line to include the 660, 661, 670 and 671; it developed the 1270 communications controller and hard-copy printing terminal; and it marketed the 1603, a microfilm system with attendant peripheral equipment.

### System Development

At the same time Phase 2 was being undertaken, Memorex started developing a small computer system as a replacement for its 1270 communications system. It was meant to be a competitor of IBM's 360/40 and was aimed directly at 360/20 users.

Memorex's objective with its systems, designated the models 40 and 50, was to design a computer for approximately $200,000 that could handle a number of varied tasks without a complicated software system. Advanced semiconductor technology was used to design such a machine, Guzy said.

The system was designed but Memorex still faced the problem of financing it. Phase I of its strategy was meant to raise cash to finance Phase 2 and a leasing subsidiary was also organized for that purpose.

Capital was still needed from external sources, however, to bankroll Phase 3, Guzy said. Memorex wanted to raise $200 million from banks and other financial institutions and Memorex would invest $20 million.

Only $19 million of that $200 million was ever raised, he said.

### The Monkey Wrench

The monkey wrench in Memorex's strategy was external: IBM's announcement of its 370 line, Guzy claimed.

"It had a major impact on our financing program . . . financiers asked, "Are you competitive?' " Guzy said.

In addition, IBM announced a number of products that were in direct competition with Memorex offerings and usually at a lower price.

The IBM 2319 disk file and the 3705 communications controller were both announced at reduced prices from previous products. Both had the result of destroying the market for Memorex's 660 disk file and 1270 controller, its two major OEM products, Guzy said.

In the first half of 1972, Memorex was installing 50 of its 1270 systems per month; its output in the third quarter was "virtually nil" for the same product and the 660 was being phased out of production, Guzy said.

### Other Problems

Memorex had a number of other problems as well. It discovered the OEM market had a problem absorbing the number of products it had planned on because of the recession, Guzy said.

Also, IBM brought a trade secrets suit against Memorex in 1970 that was settled out of court with prejudice to IBM, he said.

Delivery of the System 40 began in the fall of 1972, and sales were meeting Memorex's predictions of having 40 installed by year end, he said.

These sales were not enough to bail the company out, however, he added. The cessation of its other products had left Memorex short of incoming capital and it owed the Bank of America approximately $100 million.

Finally, Memorex ceased production of its computer system, the first initiative product it developed, in June 1973, he said.

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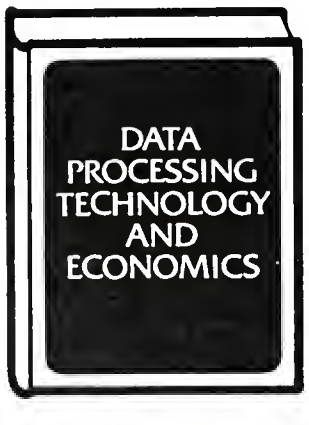

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## Systems Value Seen Doubling

(Continued from Page 47)

component improvements will be combined into a variety of commercially available system configurations for small and large systems, he said.

"Both will apparently use wideband digital buses through which communications between system elements take place. Both will use numerous individual processors for particular functions, each processor having its momentary identity determined by the stored logic contained in it," Withington predicted.

The specialized processors will have equal access to a commonly shared memory, however, so the operation of the entire system will appear monolithic.

Both small and large systems will separate control functions from computation ones, using at least one separate machine for automatic file control, communications control and/or input/output control, he added.

Each of the component processors in the small system will have a manufacturing cost of at most a few hundred dollars, conceptually similar to today's microprocessor but with substantially more power, he stated.

"In the larger system, however, the component processors used will have much more power, perhaps equivalent to today's IBM 370/168, but with a manufacturing cost in the tens of thousands of dollars," he predicted.

In the small system a 1M byte/sec transmission rate may well be adequate, while in the large system 50M byte/sec may be required, he said, adding that fiber optic technology seems a possibility for the main bus function in large computers.

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## International News

## *Japanese, Europeans Already There*

# CDC's China Sale Seen Focusing Western Attention

By Bohdan O. Szuprowicz

Special to Computerworld

The recent decision by President Ford to approve the sale to People's Republic of China of two Control Data Corp. (CDC) Cyber 172 computers once again focuses the attention of computer manufacturers on potential future markets in China.

Approval of the $5 million sale comes on the heels of a recent announcement by Hitachi Ltd. of Japan that the China National Machinery Import and Export Corp. has ordered two large Hitac computers worth approximately $8.6 million for the Central Meteorological Bureau in Peking.

So far China has not been a significant purchaser of Western computers, but since 1973 annual shipments reported under the Standard Industrial Trade Classification code 714, which includes office machines, computers and calculators, have been increasing and totaled $2.6 million in 1974, the last year from which complete statistics are available.

Japan was predictably the leading exporter accounting for 50% of the total in 1974 but France, the United Kingdom, West Germany, Italy, Denmark and the U.S. also show some exports to China.

In previous years other countries such as Czechoslovakia, Norway and Austria also exported some office equipment to China but in most cases these were small one-time shipments in the order of $100,000 each.

China first gained the attention of Western computer manufacturers in 1965 when rumors began circulating in the West that it tried to obtain an IBM Stretch computer, by way of France, to support its developing nuclear program.

In that year China also began purchasing Western computers. In 1966 an Elliott Electric 803 computer was purchased for a medical research organization but the biggest sales of that day were an International Computers Ltd. (ICL) 1903 and 1905 which were shipped to undisclosed customers in 1967. At that time no British personnel were allowed to enter China to help with the installation but a group of Chinese programmers and engineers were trained by ICL in the UK.

Since the 1960's China is believed to have acquired a Honeywell-Bull Gamma 3 computer, a Data General Nova minicomputer made under license by Nippon Minicomputer in Japan and a Redifon R-2000 machine as part of the Boeing 707 flight simulator system. In 1974 Compagnie Internationale d'Informatique (CII) and Honeywell-Bull participated in a French National Exhibition in Peking and sold an Iris 50 and an HB 61/60 which they had on display there.

In October 1973 Geo Space of Canada Ltd., a subsidiary of Applied Magnetics of Goleta, Calif., received a $5.5 million order for computer equipment and seismic data recording systems which were delivered to China in 1975.

The two CDC Cyber 172 computers have been sold to China by the Compagnie Generale de Geophysique of France also as components of a larger seismic exploration system. The sale met opposition from the Pentagon and other government agencies on the grounds the CDC computers were capable of being used for military as well as industrial purposes, particularly for support of radar systems and analysis of nuclear tests.

Ford's decision to override all objections and approve the sale is also seen as a deliberate gesture of support for the new leadership in China.

China has also pursued a policy of "self-sufficiency" and has been building its own computers. It supported a viable electronics industry which has developed to the point where China is considered to be the second largest manufacturer of radio receivers in the world after U.S. Since 1958 at least 20 different computer models have been built in China several of which are third generation machines in serial production.

Nevertheless potential markets for large sophisticated machines appear to exist in China, some within such organizations as the Meteorological service, while others exist within the 600 basic industrial enterprises which the Chinese planners conceived as the backbone of the Chinese industrialization program as far back as 1949.

About 300 of these basic plants were designed and many were built with Soviet and East European assistance. Today most of those plants are old enterprises which must be modernized to deliver the efficiency required of an industrializing country.

Since 1972 almost 100 plants were purchased by China from 11 different countries and the CDC Cyber 172 computers are in fact components of one such plant purchase. If China pursues this policy of rapid industrialization and with increasing availability of petroleum for export to earn hard currencies, future computer markets in China can be expected to develop to a more significant level.

*Szuprowicz is president of 21sth Century Research.*

# Survey Shows 60% of Japanese Users Plan Upgrades Within Three Years

TOKYO – A recent survey of over 1,000 firms in Japan revealed that more than 60% are planning computer equipment upgrades within three years.

The survey, conducted by Japan Electronic Computer Co. (JECC), showed that 28.7% of the users are planning upgrades within a year, 18.1% will do so within two years and 20.5% within three years.

Of those planning to upgrade within a year, 67.9% are going to commit more money to hardware costs, while 28% will pay the same while upgrading and 4.1% will reduce their expenditures.

JECC noted that the later the users planned to upgrade, the more funds they tend to commit to the move.

JECC also questioned users about their plans to install major advanced equipment or I/O devices within three years.

Intelligent terminals showed the highest installation rate, 18.4%, among the users while 14.5% intended to install floppy disks; 10%, key-to-disk units and 4.9% 1,000 to 3,000 line/min impact printers.

"It is interesting that both IBM 3850 or comparable mass storage systems and non-impact high speed printers with performance of 3,000 to 12,000 line/min are to be installed by 24 companies or 2.3% of the repliers," JECC noted.

The survey found the ratio of investment in DP hardware to annual sales volumes averaged 0.15%, up from 0.13% in 1974.

By industry segment, DP service bureaus were found to be making the largest investments, 16.73%, inordinately larger than the next closest, securities business, whose investment ratio was only 1.46%.

## Foreign Orders & Installations

**Mount Isa Mines Ltd. of Australia has ordered a Univac 1100/12 system to handle on-line cost and budget, workshop scheduling and production control applications for its sub-level caving and mining operations.**

Control Systems, S.P.A. has ordered two Input 80 systems from Recognition Equipment Italia, S.P.A., to be used for processing quarterly wage and salary information for the Italian social security system.

**RCA Corp. has installed Comten, Inc. data communications systems in Liege, Belgium, and Sunbury, England.**

The Burton Group, a U.K. clothing firm, has ordered a Univac 90/60 for its London data center.

**The General Mutual Insurance of French Police has installed Inforex, Inc. System 5000 file management equipment, including four disk drives and eight terminals, at its DP center.**

AEG-Telefunken of Frankfurt, West Germany, has ordered an OP-1 system, valued at $10 million, from Ontel Corp.

**The UK's Royal Air Force computer center at Innsworth, Gloucester, has installed a 2970 system from International Computers Ltd. for the Royal Air Force Personnel Services System.**

Avco-Dallah of Saudi Arabia has ordered minicomputer-based flight information systems from Conrac Corp. for installation at eight airports.

**Hokkaido Electric Power Co. Ltd. has ordered a Univac 1100/42 system from Nippon Univac Kaisha, Ltd. to be used primarily for real-time distribution, inquiry, on-line sales information and a charge assessment system.**

The Nederlandse Credietbank N.V. has ordered Bank Control System 90 equipment from Bunker Ramo Electronic Data Systems GmbH.

**El Mundo, Inc., Puerto Rican newspaper publisher, has ordered a Honeywell Level 62/60 system for media advertising accounting, circulation, reporting, accounts receivable and payroll applications.**

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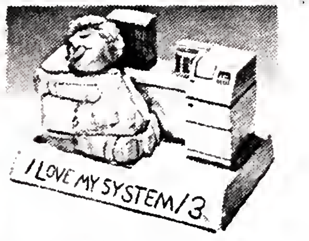

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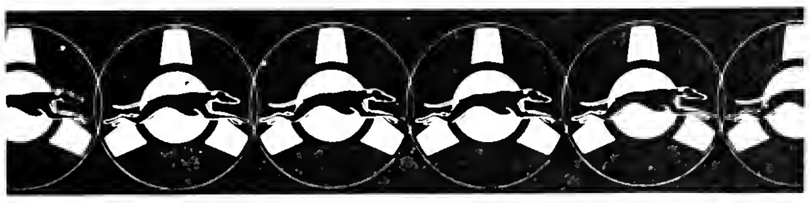
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# Back from the Brink: Insyte Shows It Can Be Done

By Molly Upton
Of the CW Staff

TORONTO – Going from $600,000 debt to a debt-free position with net worth of nearly $1 million in four years with no external financing can be done.

Insyte Corp., following a plan engineered by Ben Ronn, president, has done it.

Now positioned in the data base software market and the related applications market, the firm intends to expand, either through acquisition or internal growth, Ronn said.

Insyte has undergone several stages of growth in Ronn's attempts to make it a self sustaining profitable venture.

Insyte Corp. now includes three DP-oriented firms as well as real estate ventures, and has about 85 employees.

Computer Information Management Co. (CIM) supplies the Datacom/DB and Datacom/DC data base packages, while Information Company of America (ICA) provides scientific bibliographic documentation and information processing along with translation services.

Mauchly Wood Systems Corp., an information management consulting firm, also supports Datacom and other CIM products.

### Real Estate

One vehicle Ronn used to advantage was real estate investments.

In 1976 Insyte gained about 50% of its revenues from real estate, but Ronn said this should decrease to about 30% in 1977.

Earnings should follow the same trend as the firm's software products assume a larger role in the company's support, he said.

Ronn arrived at 3i Corp. in 1972. At the end of the fiscal year in June the firm, which was in library science type services to the medical area, had revenues of $500,000, a $1 million loss on operations and $4 million in writeoffs.

Some Wall Street parties that held interests in both 3i and Mauchly Wood Systems Corp., a contract programming firm, engineered the merger of the two firms. Neither firm had ever earned any money, Ronn said.

Ronn fired 60 of the 70 3i employees and set to work taking advantage of 3i's public status, he said.

The firm went through a reorganization, in which Insyte Corp. was made a holding company, chartered in Delaware, and 3i was merged into it on a five to one reverse split. There was no injection of any cash, he added.

### 'Tried to Stay Alive'

The firm sold assets on its books for about $95,000, traded debt for equity in another company and converted some debentures into small debt, he said.

"We tried to stay alive."

After a first quarter loss of $400,000 in 1972, the firm ended the year with a reduced loss of between $150,000 and $200,000.

Various 3i products were transferred to ICA.

In 1973, Ronn said, he couldn't borrow money, so he "backed into real estate," parlaying the $400,000 in tax credits to generate cash through buying and selling apartment houses in Houston.

### Built Equity

Insyte built equity in the projects and formed a management service company for them that is still operative and generating revenues, he said.

"We recognized the opportunity, took advantage and adopted it," he said.

Then when it had some funds, it bought Computer Information Management, a five-year-old firm that developed Data Com, a data base management package.

In September 1974, Ken Parker joined the firm as president of CIM. Revenue has tripled and the profitability is excellent, Ronn said.

CIM had less than 30 installations in 1974 and now has over 125, he said.

Mauchly Wood is a support organization for CIM and also sells application software designed for use with data bases.

Insyte is "prepared to take advantage of the industry momentum in both the systems and application area," Ronn said.

Putting the pieces together in a synergism "wasn't divine guidance, but we were cognizant of developments and the pieces fell in place," he said.

The firm has realized its goal from the real estate portion, and Ronn said he doesn't expect further growth in the transaction area, but does expect some from operations.

Substantial growth should come from the information group, he said.

# IBM Price Actions May Help Industry, Broker Predicts

NEW YORK – IBM's recent pricing moves evidenced on its 370/138 and 148 and the other mainframers' price reshufflings will not "have a destructive impact on the industry's profitability," according to a report from L.F. Rothschild & Co., an investment and brokerage house here.

Since other mainframers are also utilizing the advances in semiconductor technology, Rothschild said it is confident their gross margins are higher despite the lower per function pricing inherent in state-of-the-art products.

It cited the belief that manufacturing costs are cut in half when the density of semiconductor components is doubled.

### Maintenance Priee Hike

Of significance also is the price hike levied by IBM in maintenance rates, which thus allows others leeway in their pricing, the report observed.

"If we accept the fact that the profitability enjoyed by non-IBM mainframe vendors has historically been hampered by the costs associated with: (1) high proportions of leased equipment; (2) providing field engineering; and (3) software support, we believe that the current environment strongly favors a general reduction in profit pressures industrywide," the report said.

The reduction in IBM's sales/lease ratio reflects the more rapid escalation of costs in the rental sector of the business, Rothschild surmised.

A continuing trend toward a higher ratio of purchased machine shipments would bode well for the industry's profitability, the report indicated.

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Edited by E. Drake Lundell, this special issue will be filled with useful analysis and insightful commentary on the year's most compelling computer stories. To name just a few items, this report will cover the latest developments in computer hardware, software and communications; the effect that recent (and pending) legal decisions and/or federal policy revisions may have on the industry as a whole; and the way computers are changing our society. In addition, a variety of experts will be on hand to help shake the dust from *Computerworld's* crystal ball, and give you knowledgable forecasts of important events that are likely to occur in 1977. It's all coming your way December 27th -- and if you're involved with computers, you'll find articles, newsnotes, commentary and summary that will interest and inform you.

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# Orders & Installations

Allied Bank of Houston has ordered two Trace check processing systems from Recognition Equipment, Inc.

**General Portland, Inc., cement supplier, has installed an Inforex, Inc. data communications network linking eight division offices. The equipment includes a 1303-II key-to-disk system with two keystations at corporate headquarters and a 1300 control unit with as many as four keystations and a 200 line/min printer at each division office.**

The Phoenix-based Farm and Home Life Insurance Co. has ordered a Honeywell Level 64/20 system to expand its accounting functions, agent performance records and policy status reporting.

**McDonald's Corp. has begun installing customized point-of-sale (POS) systems from Courier Terminal Systems, Inc. in several of its more than 4,000 restaurants.**

Orchard Supply Co. of Sacramento, Calif. has installed a Burroughs Corp. B700 system for accounting, payroll, invoicing and inventory control applications.

**Shell Oil Co. has ordered a computerized process control system, including hardware and Fortran Language Industrial Control (FLIC) software from Metromation, Inc. to reduce consumption of energy at its Martinez, Calif. manufacturing complex.**

La Vogue,, a Richmond, Va., women's specialty shop, has ordered a Univac 90/30 system for on-line order entry and credit authorization, payroll processing and general accounting.

**The Louisville Trust Bank, Inc. has ordered a Burroughs version of Automated Financial Systems, Inc.'s commercial loan information system.**

Susquehanna Broadcasting Co. has ordered an NCR Criterion system to be used for processing cable TV system accounts, music scheduling for the company's FM radio stations and on-line order entry for its manufacturing division.

**The U.S. Air Force has ordered an IBM 370/168 for one-year lease to headquarters of the Strategic Air Command for support of its expanded mission and war planning requirements, as directed by the National Command Authorities and the Joint Chiefs of Staff.**

Richard Cabot Associates has ordered six OEM systems from Microdata Corp. for turnkey customers.

**The U.S. Navy has ordered an AN/UYK-30 16-bit military microcomputer from Hughes Aircraft Co. to be partitioned onto six Standard Electronic Modules (SEMs) at the Naval Avionics Facility in Indianapolis.**

The U.S. Navy has ordered digital-to-resolver converters from North Atlantic Industries, Inc.

**Towle Manufacturing Co., manufacturer of silver products, has ordered a Univac 90/30 system.**

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Must have OS sysgen exper & good mgmt. ability. Salary to $17M.
$4 Billion Dollar Bk holding Co. with 2) 370/168 IMS computers seek Programming Mgr.
Prefer EFTS or ATM Mgt. exper & Mgmt. skills for large project. Salary = $30M
CIF Project Mgr or 3600 exper. needed. Salary to $20M.
These positions are located in the great southwest!
Many openings in Fla., Alabama, Louisiana, Texas, Calif., Reno, and more. 107 Associates nationwide. **EDP SEARCH, 2401 NW 39th St., Okla. City, Okla (405) 525-8833.**

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## DATA PROCESSING

If you are interested in relocating to the beautiful Pacific Northwest, we currently have several excellent positions for EDP professionals with banking experience. The following represent a small sampling of current opportunities.

**V.P. - EDP Manager . . . . . to 40K**
**Systems Analysts . . . . . . . to 25K**
**Analyst Programmers . . . . to 22K**
**Programmers . . . . . . . . . . to 20K**

Contact Jim Morris or Bill Parfitt, Houser, Martin, Morris and Associates, 1621 114th S.E., Suite 219, Bellevue, WA 98004. (206) 455-9600.

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## EDP SALES
## FIELD SERVICE ENGRS.
## SYSTEMS ENGINEERS
## RAY HARRIS

has placed over 1,000 people in these professional areas.

Openings now exist thruout the Eastern U.S. with all recruitment and relocation fees paid. For details contact Mr. Harris ar

**LLOYD PERSONNEL**
10 Cutter Mill Rd.
Great Neck, N.Y. 11021
(516) 466-6670

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## COMPUTER SCIENCE TEACHER POSITION

Available Jan. 1977. Applicants must have Masters in Computer Operations, Data Processing, or other Computer Science discipline. Individuals must be able to teach all levels of courses in any 2 of the 3 areas above. Candidates should have related working experience and/or 1 year teaching experience. Starting salary $10-$14,000. Respond in writing only to: Mercer County Community College, Personnel Services Dept. CS, Box B, Trenton, N.J. 08690. Equal Opportunity/ Affirmative Action Employer.

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## $16,000 to $18,000
## MINI
## ANALYST

Expanding major oil Co. seeks person with 2-3 yrs. mini exper. Prefer DEC, HP, VARIAN, or Iterdata hardware bkgd. You will be trained as a hard/software planning analyst. You would be one of the key figures in the future directions planning group. This Co. has 2) 370/158-JES-3, MVS, IMS & 21 mini-computers + 4) 360's & a Dual CDC 6800.

**The BETTER WAY IS THE EDP WAY! MOVE TO THE GREAT SOUTHWEST!**
**EDP SEARCH (405) 525-8833**
**2401 NW 39th Okla. City, Ok.**

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# INSURANCE APPLICATION PROGRAMMER/ ANALYSTS

- Delightful Location in Southwest Where the Sun Always Shines
- Low Cost of Living
- Excellent Salary and Fringe Benefits

**TIRED OF THE OLD HO HUM ROUTINE?**
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Unusual creative opportunities with growing property and casualty operation for the third largest life insurance company in the world. Develop and expand Property and Casualty automated insurance systems, both personal and commercial lines using COBOL in an IBM 370 OS VS IMS environment. Dallas Fort Worth area. Act Now!! Send complete resume or call Freda James, Personnel Co-Ordinator, (817) 731-4381.

Equitable General Insurance
Company, 6385 Camp Bowie
Boulevard, Fort Worth,
Texas 76116.

**EQUITABLE**
GENERAL INSURANCE COMPANY
A Subsidiary of The Equitable Life Assurance Society of the United States

*An Equal Opportunity Employer, M/F.*

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# COMPUTER SPECIALISTS

Boeing Computer Services is seeking specialists for a broad spectrum of challenging assignments. BCS is young but a "major" in the computer industry and offers outstanding career potential combined with living in the unspoiled Pacific Northwest.

Immediate openings are for:

- **N/C Systems Analysts and Programmers**
  Integrate the APT system with process control computer systems to support the fabrication of parts on N/C machine tools. Or, design engineering plans to define geometry in digital form for direct manufacturing application. Prefer two or more years experience and knowledge of APT and/or Post Processor and large mainframes such as IBM 370 or CDC 6600.
- **Analysts/Programmers**
  Develop, implement, and maintain information or data systems. Prefer three or more years experience with information or data systems, working knowledge of 360/370 hardware, COBOL or FORTRAN, OS/JCL programming. U.S. citizenship required.
- **Data Base Designer/Analysts**
  Design, analyze and develop physical or logical data base applications. Prefer three or more years experience with IMS on large scale hardware. U.S. citizenship required.
- **Minicomputer Systems Specialists**
  Application Analysis, System Design and Software Analysis assignments involving evaluation of mini applications for data entry and Data Base management; design of mini business systems; and development, maintenance and preparation of comparative analyses of mini software and operating systems. Prefer experience with current generation of mini and IBM 370 systems. U.S. citizenship required.

Please send your résumé to The Boeing Company, P.O. Box 3707-TCU, Seattle, WA 98124.

An equal opportunity employer.

**BCS** BOEING COMPUTER SERVICES INC

### PROGRAMMER ANALYST

We want career people with growth potential. We are a rapidly growing professional data processing company located in Jacksonville, Florida, the "Bold New City of the South". B.S. Degree in Computer Science. Mathematics or Engineering required. Minimum 1 year experience in ANS COBOL plus a working knowledge of OS JCL. Send resume, in confidence, with salary requirements and availability date to Mr. A.W. Flack, Computer Power, Inc., 661 Riverside Avenue, Suite 110 East, Jacksonville, Florida 32204, or call (904) 358-1424.

### SYSTEMS ANALYST
### CAROLINAS - $20-22,000

Highly attractive Carolina location, Fortune 500 mfg firm needs several systems analysts to develop & implement a highly sophisticated, corp-wide human resource information system. Reqs degree, solid COBOL/370/DOS programming exp and several yrs systems analysis exp with personnel/payroll related systems. Excellent benefits & continued career growth potential. All employment costs paid by client co. Contact in conf. J. Schwab (704) 527-4980 or send resume to:

**FOX-MORRIS**
**Personnel Consultants**
**4000 Park Road**
**Charlotte, N.C. 28209**

### DP PROFESSIONALS

Dunhill of Fort Worth specializes in Data Processing. We have current openings in Manufacturing, Insurance and Banking for Programmer/Analysts and System Software Programmers. We operate coast-to-coast and our client companies pay our fees. Call or write for assistance in preparing your resume.

***Dunhill***
EMPLOYMENT AGENCY
of FORT WORTH, INC.
901 Ridglea Bank Bldg.
Fort Worth, Tex 76116
(817) 732-8191

# SPERRY UNIVAC IS GROWING

We're a dynamic, fast-paced division of Sperry Rand Corporation, currently expanding throughout the western U.S. If you take an aggressive approach to selling, here's a chance to grow with a company that thrives on exciting new ideas. Take us up on this uncommon opportunity to develop your career to its fullest potential.

## SALES OPENINGS

- MAIN FRAME SALES REPRESENTATIVES - We're looking for experienced computer sales professionals with a proven track record.
- PRE-SALES ANALYSTS - Excellent opportunities for individuals desiring the challenge and financial rewards of a sales career in mainframes or data entry.
- DATA ENTRY SALES REPRESENTATIVES - Currently successful in selling for vendors, such as Mohawk, Inforex, Entrex, Pertec-CMC.

Why not join us, and see what the combination of excellent equipment and hard work can produce for you. We offer a unique compensation package.

For immediate and confidential consideration, please call:

**Robert Paddock**
**Manager of Marketing Resources**
**(213) 475-8661**
Resumes may be sent to his attention at 10880 Wilshire Blvd., Suite 2110
Los Angeles, California 90024
*(No Agency Referrals Accepted)*

SPERRY UNIVAC
COMPUTER SYSTEMS

### PROGRAMMER ANALYST

Central N.J. educational institution requires an individual with a minimum of 4 years E.D.P. experience including 2 years of programming, and 2 years system design and analysis gained in an OS-MVT, COBOL environment.

Starting salary $15,223. Excellent benefit package. Qualified candidates send resume to:

CW Box 4832
797 Washington St.
Newton, Ma. 02160
*An Equal Opportunity/*
*Affirmative Action Employer M/F*

### SYSTEMS PROGRAMMER ANALYST

Seeking an experienced systems programmer to work in a small group maintaining and enhancing a 370/145 VS1 TP and batch system in a college environment. Minimum requirements include a computer-related college degree and one year of OS or VS SYSGEN/maintenance/modification/troubleshooting experience. Salary starts at $15,636 with good fringe benefits. Send your resume by 12/31/76 to: Jeff Billin, University of Idaho, Computer Services, Moscow, ID 83843. The University of Idaho is an EEO/AA employer.

### Internal Consultant

Conn. industrial has new openings for aggressive mfg & fin'l oriented indiv's to provide long range DP planning for corp executives. Broad DP bkgd and IBM systems exposure req'd. Salary range to $25K. Contact Stan Durbas for additional data.

**ROBERT HALF**
**PERSONNEL AGENCIES**
**111 Pearl Street**
**Hartford, Conn. 06103**
**(203) 278-7170**

BOEING

# Software and Computing Systems Engineers

Boeing Aerospace Company has immediate opportunities in the Seattle area for professional software and computing systems engineers with experience in:

- **Software/Computing Systems Design Analysis**
- **Real-Time Operational Software Development**
- **Microprocessor Software/Firmware Design and Development**
- **Signal Processing Software Development**
- **Support Software Design and Development**
- **Software/Computer Systems Quality Assurance**

These assignments are for command and control, avionics and related applications on a wide range of aerospace products.

A BSEE, Computer Science or other applicable engineering degree and U.S. citizenship are required.

Attractive salary, fringe benefits and moving allowances will be offered qualified candidates. Living is a pleasure in the unspoiled Northwest with its many recreational and sports activities and relaxed life styles.

Please send your resume to The Boeing Company, P.O. Box 3707-CCT, Seattle, WA 98124.

An equal opportunity employer.

**BOEING**
*Getting people together*

### PROGRAMMER/ ANALYST

We are a highly competitive security access systems company seeking a qualified intermediate programmer/analyst. The successful applicant must have 3-6 years experience in application programming of mini computers in assembly language and problem analysis. PDP-11 and DOS experience. We offer an excellent salary, company paid benefits, and growth potential. Please send resume to:

Ms. Sue Stevenson
**CARDKEY SYSTEMS**
A Division of
GREER HYDRAULICS, INC.
20339 Nordhoff St.
Chatsworth, CA 91311
*Equal Opportunity Employer*

### ANALYSIS/ PROGRAMMER

An Equal Opportunity Employer

A fast growing unit of local government that is home to the University of North Carolina (at Chapel Hill) is organizing a data processing department. We are looking for someone with experience to head this agency. Prior government employment would be helpful but is not necessary. The salary is not fixed but will be commensurate with applicant's experience. A generous fringe benefit package is provided.

Contact: S.M. Gattis
Orange County Manager
106 E. Margaret Lane
Hillsborough, N.C. 27278
(919) 732-8181

# IMS

Top Corporations require IMS "Professionals" in the following locations: Ala, Ark., Calif., Conn., Fla., Ga., Ill., Ind., Iowa, Ky., La., Mass., Md., Mich., Minn., Mo., Neb., N.J., N.Y., No. Car., Ohio, Ok., Or., R.I., Texas, Tenn., Va., Wash. and Wis. Companies offer excellent benefits, in-house career progression, challenge, and "State of the Art" Installations. All client companies are active EOE participants.

| | TO |
|---|---|
| IMS Data Base Manager | $32K |
| IMS Data Base Admin. | $28K |
| IMS Data Center Manager | $26K |
| IMS Data Base Spcl-Tech-DL-1 UCC10 | $26K |
| IMS Data Base Spcl-Apps-DBD-PSB's | $26K |
| IMS Sys Progs-IMS/VS Sysgens | $24K |
| IMS DB Design Analyst-DL-1-COBOL-PL-1 | $24K |
| IMS DB Documentation Spcl. | $24K |

Coordinate your national or regional search with one (1) recruiter. Complete confidence assured. All Fees assumed by client companies.

Bill Denny-EDP Div-CW

**Employers Personnel**

(404) 435-3251
320 Interstate No. Suite 100
Atlanta, GA 30339

# SENIOR SYSTEMS ENGINEER

CBT's Data Processing Department has an excellent opportunity available for a proven performer with 3-5 years technical experience.

Our current operating environment includes the following:

**OS/VS2 release 3 on 370/158 MP system**

Candidates should have knowledge of external and internal operating systems and be able to maintain a current MVS system. Knowledge of TCAM and TSO is also desirable.

Please submit resume, which includes salary history and expectations to Steven Bell, Manager Professional Recruitment.

The Connecticut
Bank and Trust Company
1 Constitution Plaza, Hartford, Connecticut 06115

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Computing

## DIRECTOR OF COMPUTING

The University of California at Irvine is seeking a Director of Computing who will report to the Vice Chancellor for academic affairs. Will be responsible for planning and management of campus computing including a computer facility which has a staff of 14 and a budget of $1 million. The campus is heavily committed to instructional computing and the facility operates largely in an interactive mode. Annual salary is $22,300 - $31,500. Candidates should have demonstrative management ability and technical competence in computing, an advanced degree and directly related experience in the work to be performed. A background in academic computing is preferred

Applications must be received by December 17, 1976. Please send resume, salary history and the names of 3 references to

**Professor Stephen White,**
**Chairman of the Search Committee**
**c/o Personnel Office**
**152 Administration Bldg.**
**University of California Irvine**
**California 92717**

*An Affirmative Action Employer*
*Minorities and Women are Encouraged to Apply*

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# APPLICATION and TECHNICAL PROGRAMMERS

These openings are due to an expanded scope of data processing objectives including an accelerated Material Control Program.

Here is your opportunity to join an organization that is being geared for productivity and results. We are providing our users with current data using On-Line Systems, with a corporate data base for economy and a network of communications for efficiency. Our company has a performance oriented management that provides challenge and opportunity for personal growth in all functional areas. Selected candidates should have 2-3 years working experience of COBOL or ALC. Our hardware/software environment is IBM 370/158, VSI operating system. We are migrating to MVS, IMS and TSO, experience in these areas is a definite plus.

Send complete resume with salary history to: Mr. Jerry Hope

ESSEX GROUP UNITED TECHNOLOGIES

1601 Wall Street
Fort Wayne
Indiana 46804

We are an equal opportunity employer interested in receiving inquiries from qualified minority and/or female candidates.

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## Manager of Programming Services

Basic Function and Responsibility — To direct the design, implementation, and maintenance of software systems in support of University Computer Center goals.

- Assist users in the analysis of problems and synthesis of solutions using existing facilities.
- Evaluate current user requirements and anticipate future needs in software and hardware.
- Assist in the selection of software and hardware, meeting with vendor representatives and evaluating products.
- Supervise supporting staff activities.
- Promote professional development of supporting staff.

A Master's degree in Computer Science or an equivalent combination of education and experience is necessary.

Send resume to: **Dr. Bobby R. Brown, University Computer Center, 229 Lindquist Center for Measurement, University of Iowa, Iowa City, IA 52242.**

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## Senior Systems Programmers

Develop, install and maintain system software on the computing Center's DEC system-10, IBM 370, and PDP-11 computers, and assist students, faculty and staff in their use.

A degree and considerable relevent experience is required with one or more of these machines. A thorugh understanding of operating system internals and teleprocessing principles is essential. Additional experience with programmable communication controllers for IBM 370 and DECsystem-10 is desirable.

Send cover letter and resume to Personnel Department, Skytop Offices, Syracuse University, Syracuse, New York 13210 by December 1, 1976. *An Equal Opportunity, Affirmative Action Employer M/F.*

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## "HEALTH CARE SYSTEMS PERSONNEL"

The Medical College of Virginia Hospitals (MCVH), a 100 Bed Teaching Hospital located in Richmond, Virginia, is in the process of procuring a Full-Scale (Level 3) Hospital Information System (HIS). To aid in the detailed planning installation, and ongoing requirements of this effort, MCVH is seeking qualified individuals for the position (s) of Application Specialist/Senior Analyst (Three (3) positions available); and one (1) HIS Systems Development Project Leader. Persons to be considered for these positions should possess the following minimum qualifications:

1. Two to four years experience as a Systems Analyst, with one to two of these years as a Project Leader on a major application in the Health Care Field.
2. A Bachelors Degree in Data Processing, Accounting, or Health Care related fields (Advanced degrees desirable).
3. A high degree or proficiency in communications both verbally and in writing.

All qualified applicants are invited to forward a confidential resume' including salary requirements and personal references to: Director of Personnel, P.O. Box 66, 1220 E. Marshall Street, Richmond, Virginia 23298.

*An Equal Opportunity Employer.*

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## PROGRAMMER ANALYST SYSTEMS

Oakland County is seeking a select employee for a key technical position in systems programming. Applicants must have at least four years, within the last five years, of full-time paid work experience in software systems programming, including at least two years running CICS or VM in a DOS or OS/VS 1 environment.

Oakland County is in the midst of rapidly expanding its teleprocessing system which serves County government and many units of local government, including a 23 agency law enforcement information network, and will begin a conversion from DOS/VS to OS/VS1 this fall.

Salary range: $17,715-$19,671. Beginning salary is dependent upon applicability of prior experience and qualifications. The salary is supplemented by an outstanding fringe benefit package.

Applications will be accepted until further notice.

For additional information or to obtain the necessary application materials, please contact:

**The Personnel Department**
OAKLAND COUNTY
**1200 N. Telegraph Rd.**
**Pontiac, MI 48053**
**Phone: (313) 858-0530**

*A Merit System,*
*Equal Opportunity and*
*Affirmative Action Employer*
Daniel T. Murphy
County Executive

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# DATA COMMUNICATION SYSTEMS ENGINEERS

To evaluate data communication module and equipment for applicability in Retail Point-of-Sale terminal systems. Will generate standards for data communication circuit handshaking and will provide future communication products. To provide support for data communication system analysis and proposals for future retail systems.

Candidates should bring a degree and a good understanding of Binary Synchronous (BSC), ANSI Asynchronous and SDLC Control procedures. Knowledge of Modems, Communication adapters, and Communication procedures essential and a knowledge of Common Carrier facilities desirable.

# SYSTEMS ARCHITECTURE DEVELOPMENT ENGINEERS

To define system requirements involving real-time POS micro/mini computer systems.

Both positions involve the conceptual design, performance analysis and critical performance/cost trade-offs; one will emphasize the software system elements, the other the hardware elements.

An experience range of from 4-7 years in planning, design, analysis, and documentation of on-line, real-time systems mixed with some detail design work in both hardware and software development will meet the challenge of these 2 senior openings in our Advanced Development group along with your degree in engineering/computer science.

NCR's Point-of-Sale organization is expanding to meet the demands of the exploding POS market.

*NCR's P.O.S. facility is located in a lovely, rural community in east central Ohio.*

*We invite you to respond as soon as practical.*

Robert W. Donovan
Terminal Systems Division-Cambridge
NCR Corporation
Cambridge, Ohio 43725
(614) 439-0398

NCR

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# Manager

## Corporate Information Processing

This is a senior and highly visible corporate level position requiring a tough, no-nonsense manager and technical leader who has the ability to lead, organize and motivate a highly qualified technical and operating staff and steer a state-of-the-art data center into the next century. You will direct the activity of the Data Center and the Service Organization with primary responsibilities to provide corporate wide consulting services to applications managers and users and to ensure adequate hardware and manpower capacity necessary to provide timely and quality service to support central software engineering and MIS functions.

Ideally, you will have a state-of-the-art technical background in managing a large time-sharing production facility in support of software engineering and MIS activities. Equally important you must be an aggressive planner and negotiator with demonstrated ability addressing the needs of users.

If you are seeking an opportunity to utilize your ability to the fullest in an unprecedented growth situation, we invite you to investigate this position.

*Forward resume outlining salary requirements to Barry Bograd, Digital Equipment Corporation, Dept. G1129, 162 Main Street, Maynard, Massachusetts 01754.*

digital

digital equipment corporation

*an equal opportunity employer m/f*

## SYSTEMS ANALYST

Participate in major expansion of MIS dept w/dynamic E. Mass mfg co. Several positions currenlty available for aggressive indiv's w/solid COBOL prog & proven systems design exp in the areas of mfg, mktg, order entry, acctg/finance. Salary to $20K (fee paid). Contact Bill Grady (in confidence).

**ROBERT HALF**
**PERSONNEL AGENCIES**
140 Federal St.
Boston, Mass. 02110
(617) 423-6440

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## APPLICATIONS PROGRAMMER

The Purdue University Administrative Data Processing Center has openings for experienced applications programmers. The computer facility is an IBM 370/145 with OS/VS1, C.I.C.S., and ROSCOE.

Desired Qualifications:
- Business applications programming experience
- ANS COBOL
- College degree
- OS/VS JCL

Excellent fringe benefit program in the environment of a large university.

Please submit resume with references, salary history, and work experience to: Mr. T.L. Haworth, Personnel Services - ADMS, Purdue University, West Lafayette, IN 47907, (317) 749-6256

*An Equal Access/*
*Equal Opportunity Employer*

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DEVELOPMENT OF LARGE SCALE MANUFACTURING AND COMMERCIAL DATA BASE SYSTEMS NECESSITATES EXPANSION OF OUR INFORMATION SYSTEMS STAFF. OUR PRESENT AND PROJECTED GROWTH OFFERS OPPORTUNITIES FOR CAREER ENRICHMENT AND ADVANCEMENT. OPENINGS EXIST FOR PROFESSIONALS SEEKING CAREER OPPORTUNITIES AS:

### Hardware/Performance Specialist

4 years experience as COBOL programmer, 2 years as systems software programmer and/or 2 years as hardware specialist or experience in an environment where hardware/performance duties are required. BS in Computer Science or Business or equivalent technical training and experience.

### Programmer Analyst

2 to 4 years as programmer analyst in an OS environment using ANS COBOL and on-line systems. BS Degree in Information Systems or Business or equivalent experience. Experience in on-line systems using IMS desirable.

### Systems Analyst

2 to 4 years experience as systems analyst or programmer analyst on manufacturing, accounting or marketing systems. BS Degree in Accounting or Business or equivalent experience.

### Programmer

2 to 4 years experience utilizing ANS COBOL, IBM OS/VS environment with knowledge of structured programming, HIPO flowcharting, on-line programming and IMS helpful. BS Degree in Math or Business or equivalent experience.

MOBAY

A LEADER IN OUR INDUSTRY, WE OFFER COMPETITIVE BASE SALARIES AND FULLY COMPREHENSIVE, COMPANY-PAID FRINGE BENEFITS.

SUBMIT RESUMES, INCLUDING SALARY REQUIREMENTS, TO: B.J. PETTKO

**MOBAY CHEMICAL CORPORATION**
Parkway West
Pittsburgh, Pennsylvania 15205
*We are an Equal Opportunity Employer . . .*
*M/F/Handicapped*

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Southeastern Locations
Top National Companies

**Systems Analyst $18 to 22K**
Real Time; Mfr. applications, Assembler/Fortran; Mini exp.

**Systems Programmer $16 to $18K**
OS/VS; Sysgens & Utilities; BAL

**Prog/Analyst $15 to $20K**
COBOL; PL1 or BAL; Mfr. or fin. exp. Data Base a plus.

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NO CONTRACT
FEE
INTERVIEW
RELOCATION
PAID
(919) 378-9884

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MASSACHUSETTS
PROGRAMMERS

A unique alternative employment opportunity is available if you've had at least 2 years experience in any of the following categories.

**SOFTWARE:** operating systems, monitors, editors, translators, cross assemblers.

**COMMUNICATIONS:** Real time, teleprocessing, time-sharing systems.

**BUSINESS:** 370 or PDP 10, 11 COBOL for; D.B.M., M.I.S., and operations research.

**SCIENTIFIC:** Fortran or Algol for math, engineering, simulations, data reduction.

**Available For Full Time Work?**
Send resume to:

**EDP TEMPS**
1277 Main St.
Waltham, Mass. 02154
(617) 891-5572

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## Director, Computer Systems Research

An applied research department is being established in the systems division of a major computer mainframe company. We are seeking an experienced research manager to staff and lead this deparment.

The areas of research will include computer architecture and organization, security, data base management systems, operating system efficiency, and fault-tolerance.

Applicants must have a Ph.D. in computer science or engineering and have demonstrated abilities in individual research as well as in directing research activities. The successful applicant will also have an established reputation that will enable him or her to attract other researchers to the department.

Interested person please send a resume including salary requirements to:

**G-87, P.O. BOX 2068**
**Philadelphia, PA 19103**
*An Equal Opportunity Employer M/F*

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## SYSTEMS DEVELOPMENT

### LEAD ANALYST

Significant opportunities for professional Data Processing Systems Developers to make major and visible contributions now exist at NORTON COMPANY. Norton, a $560 million multi-national producer of abrasives, safety products and industrial ceramics, is committed to the development of advanced business information systems within the context of master systems plans. Accomplished Data Processing Project leaders are needed to participate in the design and implementation activities associated with this development effort. An MBA degree or equivalent broad business background is highly desirable.

The successful candidate will have at least 5 years of analytical background and 3 years of project leadership experience. A proven record of directing and participating in the technical design and implementation of successful automated manufacturing systems is required. The ability to communicate effectively, both orally and in writing, with other project team members, computer services management, vendor sources and user management is essential.

### SYSTEMS ANALYST

Viable candidates will have a thorough working knowledge of computer capabilities, programming and computer services operations. This experience, gained in five or more years of data processing activity, including previous analytical assignments, must be supplemented by other skills. The ability to apply the principles of Top-Down Development in the design and development of financial, manufacturing and marketing computer systems is required. These duties will be performed through clear problem definition, by obtaining agreement on project objectives and by evaluating and recommending alternatives. The Systems Analyst will also develop project work programs and exercise functional responsibility over project team members.

### PROGRAMMER

Norton seeks candidates with at least two to four years of extensive programming experience using COBOL. Applicants should be willing to work in a structured programming environment supporting programming needs in the areas of finance, manufacturing and marketing. These duties will be performed through clear problem definition and within a team environment.

Norton hardware/software includes IBM S/370-158, IMS/US/DB-DC, OS/MVS with plans to move to TSO during the first quarter of 1977.

An interested, qualified candidate should send a resume today to Manager of Staffing, Norton Company, 1 New Bond Street, Worcester, Mass. 01606. Norton Company offers excellent starting salaries and a comprehensive benefits program.

*An Equal Opportunity Employer Male/Female*

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## SYSTEMS PROGRAMMER (IMS)

Top-caliber software professionals will find all they want in this opportunity: the challenge of "state of the art" IMS/VS system development and support; a competitive salary range up to $20K as well as a more than competitive benefits package; and, when you're not on the job, all the social, cultural, educational and recreational benefits of living in Minnesota's Twin Cities of Minneapolis and St. Paul. Hennepin County provides a broad range of governmental services to the one million residents of Minneapolis and suburbs. To do this, we have a large-scale, sophisticated data processing organization commited to continual enhancement and improvement. This position contributes to that enhancement by supporting the application of IMS/VS 1.3 capabilities in such areas as Finance, Courts, Social Services, Public Works, and others.

If you are a systems professional with at least one year of experience, preferably in IMS, send your resume in complete confidence by December 8 to: David Sier, Hennepin County Personnel Department, A-305 Government Center, Minneapolis, Minnesota 55487.

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## DIRECTOR OF COLLEGE COMPUTER CENTER

The State University College at Oneonta, N.Y. is seeking a Computer Center Director preferably with both management and academic experience. The individual selected will be responsible for overseeing the design and development of administrative, instructional, and research applications, employing COBOL and FORTRAN IV on a Burroughs B-4700 system.

Applicants should have a Ph.D. with administrative experience. Salary up to $23,800, depending on experience and ability.

Oneonta is one of the several colleges of arts and science in the State University of New York System. It is located 200 miles north-west of New York City with a student enrollment of approximately 6000. Fringe benefits up to 32% of salary. The college is an Affirmative Action/Equal Opportunity Employer.

Closing date for applications: January 15, 1977. Please reply to:

**Robert S. Morrissey**
**Chairman of Selection Committee**
**Ad. 135**
**State University College**
**Oneonta, N.Y. 13820**

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## PARTIAL UPSTATE N.Y. OPENINGS

**Sr. Sys. Analyst To $22K**
155 OS/MVT. Min. 5 yrs. exp. Prefer Mfg. bkgd.

**Sr. Prog./Analyst To $20K**
158 OS ALC, COBOL, FINANCIAL

**Systems Analyst To $20K**
145 DOS, DB, TP, COBOL.

**EDP Audit, Jr. To $12K**
C.S. Degree & min. exp.

100's of other openings nationally. All fees Client paid.

**Resume in Strict Confidence to: Meehan Associates, 3380 Monroe Ave., Rochester, N.Y. 14618. (716) 381-0770**

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## PROGRAMMERS

Digital Computer Controls, a major minicomputer manufacturer with over 8000 computers installed, seeks the following professionals to grow with us in our Northern New Jersey Headquarters.

- Senior Systems Programmers
- Senior Systems Analysts/Programmers
- Systems Programmers

These positions require individuals with ASSEMBLY language experience in the maintenance of Operating Systems Software. Preferance will be given to minicomputer experience. Backgrounds in Time-Sharing and Communications will be valuable.

We offer excellent salaries and benefits, and on going opportunities for career advancement.

**For prompt consideration, send resume in confidence to: PERSONNEL DEPT.**

**DIGITAL COMPUTER CONTROLS INC**

**12 Industrial Road, Fairfield, N.J. 07006**
*An Equal Opportunity Employer M/F*

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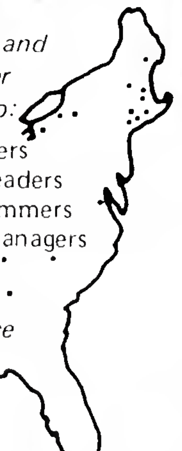

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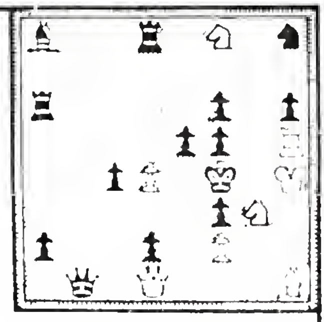

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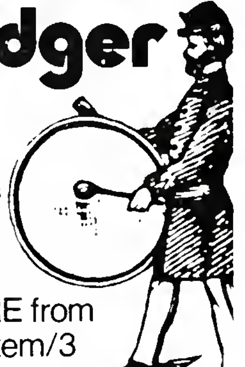

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Frank Cancro, Vice President

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Dept. CW-T
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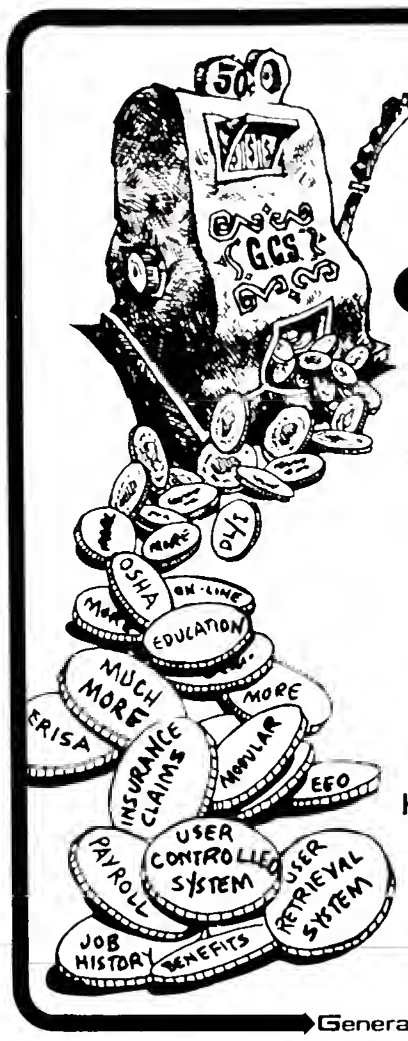

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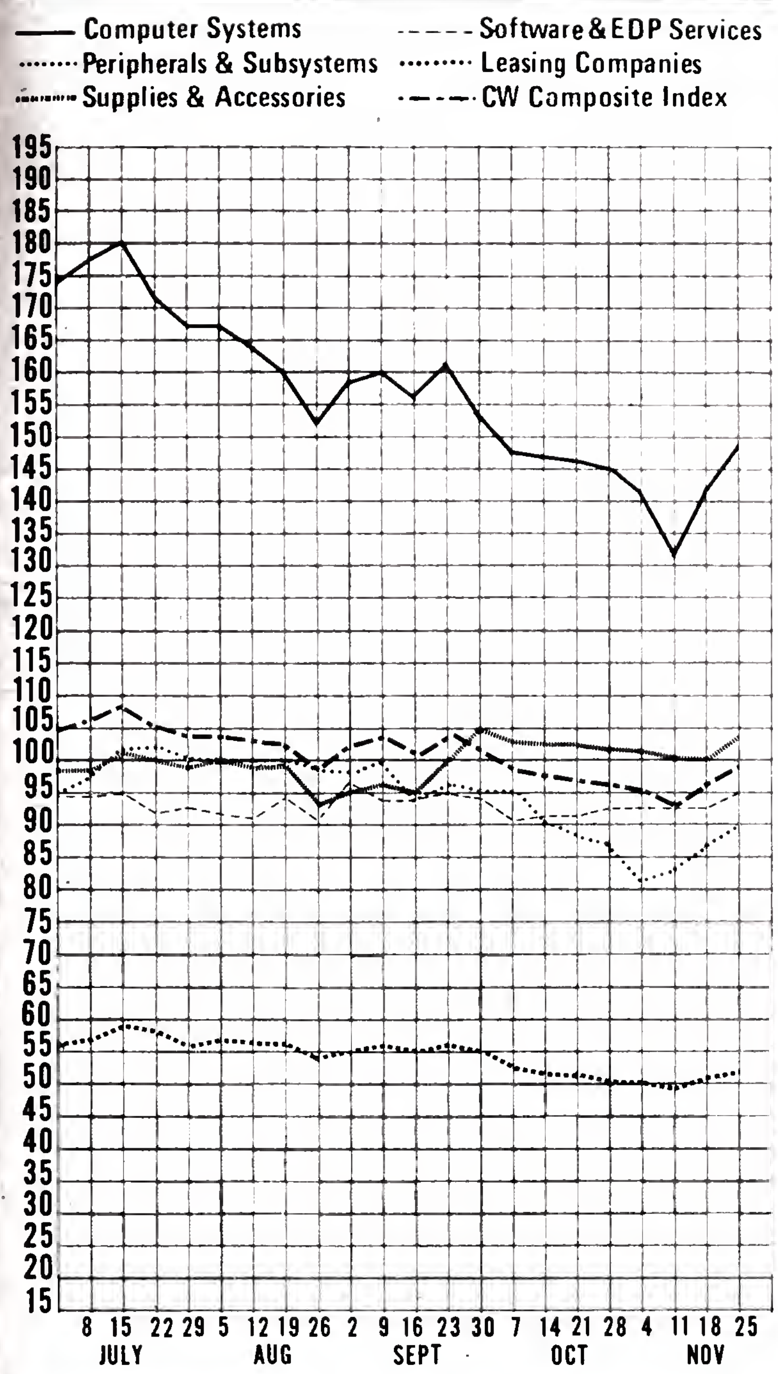
## COMPUTERWORLD Computer Stocks Trading Indexes



# Earnings Reports

### DPF

Three Months Ended Aug. 31

| | 1976 | 1975 |
|---|---|---|
| Shr Ernd | $.30 | $.03 |
| Revenue | 6,838,000 | 5,689,000 |
| Tax Cred | 138,000 | 28,000 |
| Earnings | 1,285,000 | 116,000 |

### ELECTRONIC ARRAYS

Three Months Ended Sept. 30

| | 1976 | 1975 |
|---|---|---|
| Shr Ernd | ..... | $.10 |
| Revenue | $3,551,000 | 3,817,000 |
| Tax Cred | a(25,000) | 74,000 |
| Earnings | (1,487,000) | 175,000 |
| 6 Mo Shr | ..... | .13 |
| Revenue | 8,600,000 | 7,534,000 |
| Tax Cred | ..... | 81,000 |
| Earnings | (1,342,000) | 236,000 |

a-Reversal of tax-loss carryforward.

### ELECTRONIC ASSOCIATES

Three Months Ended Oct. 1

| | 1976 | a1975 |
|---|---|---|
| Shr Ernd | ..... | $.64 |
| Revenue | $6,154,000 | 7,604,000 |
| Disc Op | ..... | 684,000 |
| Tax Cred | 12,000 | 818,000 |
| Earnings | (780,000) | 1,707,000 |
| 9 Mo Shr | ..... | .89 |
| Revenue | 17,905,000 | 22,854,000 |
| Disc Op | 544,000 | 684,000 |
| Tax Cred | 276,000 | 1,119,000 |
| Earnings | (1,132,000) | 2,368,000 |

a-Restated.

### COMPUTER SCIENCES

Three Months Ended Oct. 1

| | 1976 | 1975 |
|---|---|---|
| Shr Ernd | $.26 | $.12 |
| Revenue | 57,943,000 | 53,546,000 |
| Tax Cred | 750,000 | ..... |
| Earnings | 3,668,000 | 1,723,000 |
| 6 Mo Shr | .49 | .23 |
| Revenue | 113,484,000 | 103,913,000 |
| Tax Cred | 1,500,000 | ..... |
| Earnings | 6,956,000 | 3,247,000 |

### COMPUTER PRODUCTS

Three Months Ended Sept. 24

| | 1976 | 1975 |
|---|---|---|
| aShr Ernd | $.08 | $.04 |
| Revenue | 1,522,430 | 1,025,242 |
| Earnings | 118,200 | 57,564 |
| a9 Mo Shr | .25 | .15 |
| Revenue | 4,318,723 | 3,113,352 |
| Earnings | 361,474 | 201,609 |

a-Reflects Nov. 1, 1976 20% stock dividend.

# Computerworld Sales Offices

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Advertising Administrator
*Judy Milford*
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Telex: USA-92-2529

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TRADE QUOTES

# Computerworld Stock Trading Summary

CLOSING PRICES TUESDAY, NOVEMBER 23, 1976

All statistics compiled, computed and formatted by
TRADE★QUOTES, INC.
Cambridge, Mass. 02139

| EXCH | | PRICE 1976 RANGE (1) | CLOSE NOV 23 1976 | WEEK NET CHNGE | WEEK PCT CHNGE |
|---|---|---|---|---|---|
| | COMPUTER SYSTEMS | | | | |
| O | AMDAHL CORP | 23-30 | 27 5/8 | - 1/4 | -0.8 |
| N | BURROUGHS CORP | 84-108 | 91 1/4 | +1 3/8 | +1.5 |
| O | COMPUTER AUTOMATION | 10-19 | 16 3/4 | +2 5/8 | +18.5 |
| N | CONTROL DATA CORP | 18-27 | 23 1/8 | +1 1/8 | +5.1 |
| N | DATA GENERAL CORP | 40-60 | 46 3/4 | +1 3/4 | +3.8 |
| O | DATAPOINT CORP | 24-46 | 28 1/2 | + 1/4 | +0.8 |
| O | DIGITAL COMP CONTROL | 2-7 | 5 3/4 | + 3/8 | +6.9 |
| N | DIGITAL EQUIPMENT | 46-60 | 53 5/8 | +1 3/8 | +2.6 |
| N | ELECTRONIC ASSOC. | 2-5 | 2 | - 1/8 | -5.8 |
| A | ELECTRONIC ENGINEER. | 7-16 | 8 3/4 | + 3/4 | +9.3 |
| O | FOUR-PHASE SYSTEMS | 13-21 | 15 1/4 | + 7/8 | +6.0 |
| N | FOXBORO | 28-50 | 49 | +4 1/2 | +10.1 |
| O | GENERAL AUTOMATION | 4-11 | 4 1/2 | + 1/4 | +5.8 |
| O | GRI COMPUTER CORP | 1-1 | 1/2 | - 1/8 | -20.0 |
| N | HEWLETT-PACKARD CO | 80-117 | 89 | +5 5/8 | +6.7 |
| N | HONEYWELL INC | 34-56 | 44 | + 1/2 | +1.1 |
| N | IBM | 227-288 | 269 3/8 | +1 7/8 | +0.7 |
| O | MANAGEMENT ASSIST | 1-7 | 7 3/8 | +1 5/8 | +28.2 |
| O | MEMOREX | 17-33 | 20 3/4 | +2 1/2 | +13.6 |
| O | MICRODATA CORP | 10-28 | 15 7/8 | +1 3/4 | +12.3 |
| O | MODULAR COMPUTER SYS | 3-14 | 4 3/4 | +1 | +26.6 |
| N | NCR | 24-37 | 33 7/8 | + 5/8 | +1.8 |
| O | PRIME COMPUTER INC | 4-15 | 14 1/2 | + 1/2 | +3.5 |
| N | PERKIN-ELMER | 19-27 | 20 7/8 | +1 5/8 | +8.4 |
| N | RAYTHEON CO | 45-67 | 61 3/4 | +1 3/4 | +2.9 |
| N | SPERRY RAND | 40-52 | 44 1/2 | + 1/8 | +0.2 |
| O | SYCOR INC | 9-31 | 12 | - 1/2 | -4.0 |
| A | SYSTEMS ENG. LABS | 5-10 | 6 1/8 | 0 | 0.0 |
| N | VARIAN ASSOCIATES | 12-17 | 13 1/2 | + 1/4 | +1.8 |
| A | WANG LABS. | 11-20 | 14 7/8 | +1 1/4 | +9.1 |
| | LEASING COMPANIES | | | | |
| O | BOOTHE COMPUTER CORP | 1-8 | 6 7/8 | + 3/8 | +5.7 |
| O | COMDISCO INC | 3-10 | 9 1/2 | 0 | 0.0 |
| A | COMMERCE GROUP CORP | 2-3 | 1 3/4 | 0 | 0.0 |
| A | COMPUTER INVSTRS GRP | 1-3 | 1 3/8 | 0 | 0.0 |
| M | DATRONIC RENTAL | 1-8 | 1 1/4 | + 3/8 | +42.8 |
| A | DCL INC | 1-1 | 5/8 | 0 | 0.0 |
| N | DPF INC | 5-8 | 6 5/8 | - 1/4 | -3.6 |
| N | ITEL | 6-15 | 12 3/4 | + 1/4 | +2.0 |
| N | LEASCO CORP | 6-19 | 18 1/8 | + 1/8 | +0.6 |
| O | LEASPAC CORP | 0-1 | 1/8 | 0 | 0.0 |
| O | NRG INC | 0-1 | 1/8 | 0 | 0.0 |
| A | PIONEER TEX CORP | 6-9 | 7 1/2 | + 1/4 | +3.4 |
| N | U.S. LEASING | 7-12 | 8 7/8 | + 1/4 | +2.8 |

EXCH: N=NEW YORK; A=AMERICAN: P=PHIL-BALT-WASH
L=NATIONAL: M=MIDWEST: O=OVER-THE-COUNTER
O-T-C PRICES ARE BID PRICES AS OF 3 P.M. OR LAST BID
(1) TO NEAREST DOLLAR

| EXCH | | PRICE 1976 RANGE (1) | CLOSE NOV 23 1976 | WEEK NET CHNGE | WEEK PCT CHNGE |
|---|---|---|---|---|---|
| | SOFTWARE & EDP SERVICES | | | | |
| O | ADVANCED COMP TECH | 1-3 | 1 1/8 | + 1/8 | +12.5 |
| O | ANACOMP INC | 6-11 | 6 3/4 | 0 | 0.0 |
| A | APPLIED DATA RES. | 2-4 | 3 7/8 | + 1/4 | +6.8 |
| N | AUTOMATIC DATA PROC | 17-35 | 29 1/2 | +2 | +7.2 |
| O | COLEMAN AMERICAN COS | 2-6 | 2 3/8 | 0 | 0.0 |
| O | COMPU-SERV NETWORK | 3-10 | 8 | 0 | 0.0 |
| O | COMPUTER DIMENSIONS | 3-7 | 6 1/4 | + 1/2 | +8.6 |
| O | COMP ELECTION SYSTMS | 5-9 | 5 | - 1/4 | -4.7 |
| O | COMPUTER HORIZONS | 1-2 | 1 3/4 | + 1/4 | +16.6 |
| O | COMPUTER NETWORK | 2-7 | 7 1/4 | +1 1/2 | +26.0 |
| N | COMPUTER SCIENCES | 4-8 | 6 1/8 | + 1/2 | +8.8 |
| O | COMPUTER TASK GROUP | 1-2 | 1 1/4 | 0 | 0.0 |
| O | COMPUTER USAGE | 3-6 | 2 5/8 | - 1/8 | -4.5 |
| O | COMSHARE | 2-9 | 6 | + 1/2 | +9.0 |
| O | DATA DIMENSIONS INC | 2-4 | 3 | 0 | 0.0 |
| O | DATATAB | 1-2 | 1 1/2 | 0 | 0.0 |
| N | ELECTRONIC DATA SYS. | 12-18 | 15 3/8 | - 1/2 | -3.1 |
| O | INFONATIONAL INC | 1-1 | 1/8 | 0 | 0.0 |
| O | INSYTE CORP | 1-3 | 1 1/2 | 0 | 0.0 |
| O | IPS COMPUTER MARKET. | 1-2 | 1 1/8 | 0 | 0.0 |
| O | KEANE ASSOCIATES | 2-4 | 2 3/4 | + 3/8 | +15.7 |
| O | KEYDATA CORP | 1-5 | 1 3/4 | + 1/4 | +16.6 |
| O | LOGICON | 3-5 | 5 3/8 | + 3/8 | +7.5 |
| A | MANAGEMENT DATA | 1-3 | 2 | 0 | 0.0 |
| A | NATIONAL CSS INC | 13-25 | 19 5/8 | +1 5/8 | +9.0 |
| O | NATIONAL DATA CORP | 4-7 | 4 7/8 | - 1/8 | -2.5 |
| A | ON LINE SYSTEMS INC | 17-22 | 20 1/4 | +1 5/8 | +8.7 |
| N | PLANNING RESEARCH | 3-5 | 3 1/2 | - 1/8 | -3.4 |
| O | PROGRAMMING & SYS | 1-1 | 1/4 | - 1/8 | -33.3 |
| O | RAPIDATA INC | 2-5 | 1 3/4 | + 1/8 | +7.6 |
| O | REYNOLDS & REYNOLD | 13-21 | 15 3/4 | + 1/2 | +3.2 |
| O | SCIENTIFIC COMPUTERS | 1-1 | 7/8 | 0 | 0.0 |
| O | TYMSHARE INC | 14-28 | 16 1/2 | 0 | 0.0 |
| A | URS SYSTEMS | 3-5 | 3 1/2 | 0 | 0.0 |
| N | WYLY CORP | 1-7 | 1 1/8 | - 1/8 | -10.0 |
| | PERIPHERALS & SUBSYSTEMS | | | | |
| N | ADDRESSOGRAPH-MULT | 8-13 | 10 1/8 | - 7/8 | -7.9 |
| O | ADVANCED MEMORY SYS | 4-10 | 6 | - 1/4 | -4.0 |
| N | AMPEX CORP | 5-10 | 6 3/8 | + 1/8 | +2.0 |
| O | ANDERSON JACOBSON | 2-4 | 2 7/8 | - 1/8 | -4.1 |
| O | APPLIED DIG DATA SYS | 13-25 | 16 | 0 | 0.0 |
| O | BEEHIVE MEDICAL ELEC | 3-9 | 8 1/2 | + 1/8 | +1.4 |
| A | BOLT,BERANEK & NEW | 7-11 | 7 7/8 | 0 | 0.0 |
| N | BUNKER-RAMO | 5-10 | 7 | - 1/8 | -1.7 |
| A | CALCOMP | 4-7 | 4 5/8 | - 1/8 | -2.6 |
| O | CAMBRIDGE MEMORIES | 0-6 | 1/2 | 0 | 0.0 |
| N | CENTRONICS DATA COMP | 20-36 | 23 1/8 | -1 3/4 | -7.0 |
| O | CODEX CORP | 22-42 | 29 1/2 | +1 | +3.5 |
| O | COGNITRONICS | 1-1 | 1/2 | 0 | 0.0 |
| O | COMPUTER COMMUN. | 1-6 | 4 3/4 | - 1/8 | -2.5 |
| O | COMPUTER CONSOLES | 4-7 | 4 3/4 | + 1/2 | +11.7 |
| A | COMPUTER EQUIPMENT | 1-3 | 1 7/8 | 0 | 0.0 |
| O | COMPUTER TRANSCEIVER | 1-3 | 7/8 | 0 | 0.0 |
| O | COMTEN | 4-9 | 8 | + 7/8 | +12.2 |
| N | CONRAC CORP | 20-25 | 21 7/8 | + 3/8 | +1.7 |

| EXCH | | PRICE 1976 RANGE (1) | CLOSE NOV 23 1976 | WEEK NET CHNGE | WEEK PCT CHNGE |
|---|---|---|---|---|---|
| O | DATA ACCESS SYSTEMS | 1-5 | 5 | + 1/4 | +5.2 |
| O | DATA 100 | 6-13 | 6 3/4 | + 1/8 | +1.8 |
| A | DATA PRODUCTS CORP | 5-15 | 11 1/8 | + 1/8 | +1.1 |
| O | DATA TECHNOLOGY | 1-2 | 1 7/8 | + 3/8 | +25.0 |
| O | DATUM INC | 1-2 | 3/4 | + 1/8 | +20.0 |
| O | DECISION DATA COMPUT | 1-4 | 1 1/2 | 0 | 0.0 |
| O | DELTA DATA SYSTEMS | 1-1 | 1/2 | 0 | 0.0 |
| N | ELECTRONIC M & M | 1-4 | 2 7/8 | + 1/4 | +9.5 |
| O | FABRI-TEK | 1-1 | 7/8 | 0 | 0.0 |
| O | GENERAL COMPUTER SYS | 0-2 | 3/8 | - 1/8 | -25.0 |
| N | HAZELTINE CORP | 4-12 | 8 3/4 | + 1/8 | +1.4 |
| N | HARRIS CORP | 34-55 | 53 7/8 | +3 1/2 | +6.9 |
| A | INCOTERM CORP | 9-20 | 11 5/8 | + 1/4 | +2.1 |
| O | INFOREX INC | 3-7 | 4 1/2 | + 5/8 | +16.1 |
| O | INFORMATION INTL INC | 10-18 | 12 1/8 | + 1/8 | +1.0 |
| O | INTEL CORP | 47-109 | 53 1/2 | +5 | +10.3 |
| A | LUNDY ELECTRONICS | 3-7 | 3 7/8 | + 1/2 | +14.8 |
| O | MSI DATA CORP | 3-7 | 6 1/8 | - 1/8 | -2.0 |
| A | MILGO ELECTRONICS | 15-22 | 20 1/2 | - 1/8 | -0.6 |
| N | MOHAWK DATA SCI | 3-10 | 5 7/8 | + 3/8 | +6.8 |
| O | PENRIL CORP | 1-3 | 1 3/4 | - 1/8 | -6.6 |
| A | PERTEC CORP | 3-8 | 6 5/8 | + 7/8 | +15.2 |
| A | POTTER INSTRUMENT | 2-2 | 1 3/4 | 0 | 0.0 |
| O | PRECISION INST. | 2-10 | 2 | 0 | 0.0 |
| O | QUANTOR CORP | 4-6 | 4 1/2 | - 1/8 | -2.7 |
| O | RECOGNITION EQUIP | 6-11 | 9 | + 5/8 | +7.4 |
| N | SANDERS ASSOCIATES | 6-11 | 8 1/2 | + 1/2 | +6.2 |
| O | SCAN DATA | 1-4 | 1 1/4 | 0 | 0.0 |
| O | STORAGE TECHNOLOGY | 9-13 | 10 1/2 | - 1/8 | -1.1 |
| O | T BAR INC | 5-10 | 6 1/4 | + 3/4 | +13.6 |
| O | TALLY CORP. | 4-6 | 5 1/2 | + 1/8 | +2.3 |
| O | TEC INC | 3-7 | 6 1/2 | 0 | 0.0 |
| N | TEKTRONIX INC | 45-69 | 62 3/8 | +2 3/8 | +3.9 |
| N | TELEX | 2-5 | 2 1/4 | 0 | 0.0 |
| O | WANGCO INC | 11-22 | 21 1/8 | 0 | 0.0 |
| O | WILTEK INC | 2-2 | 1 1/2 | + 1/8 | +9.0 |
| | SUPPLIES & ACCESSORIES | | | | |
| O | ADVANCED SYSTEMS INC | 1-4 | 3 3/8 | 0 | 0.0 |
| O | BALTIMORE BUS FORMS | 3-5 | 3 5/8 | 0 | 0.0 |
| A | BARRY WRIGHT | 6-10 | 9 | + 3/8 | +4.3 |
| O | CYBERMATICS INC | 0-1 | 3/8 | + | +16.7 |
| A | DATA DOCUMENTS | 25-45 | 45 1/4 | 0 | 0.0 |
| O | DUPLEX PRODUCTS INC | 13-24 | 12 3/4 | 0 | 0.0 |
| N | ENNIS BUS. FORMS | 6-8 | 5 3/4 | + 1/8 | +2.2 |
| O | GRAHAM MAGNETICS | 8-13 | 10 1/2 | + 1/4 | +2.4 |
| O | GRAPHIC CONTROLS | 13-19 | 16 1/4 | 0 | 0.0 |
| N | 3M COMPANY | 53-66 | 58 1/2 | +2 | +3.5 |
| O | MOORE CORP LTD | 32-51 | 33 3/4 | + 1/2 | +1.5 |
| N | NASHUA CORP | 11-18 | 17 3/8 | +1 5/8 | +10.3 |
| O | STANDARD REGISTER | 15-19 | 17 1/2 | + 1/4 | +1.4 |
| O | TAB PRODUCTS CO | 5-11 | 9 | + 1/4 | +2.8 |
| N | UARCO | 19-25 | 19 1/2 | + 1/8 | +0.6 |
| A | WABASH MAGNETICS | 4-10 | 10 1/4 | +1 | +10.8 |
| N | WALLACE BUS FORMS | 19-25 | 22 1/8 | 0 | 0.0 |

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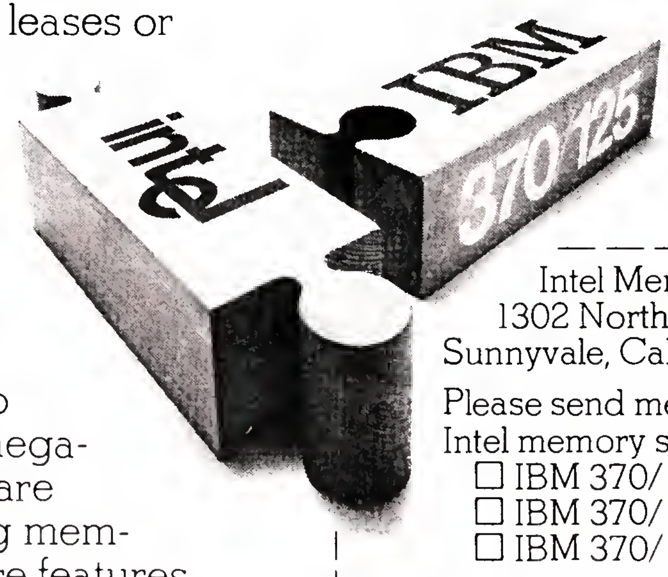

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